

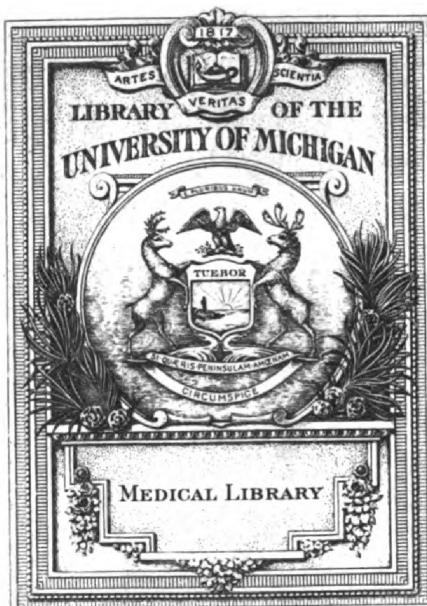


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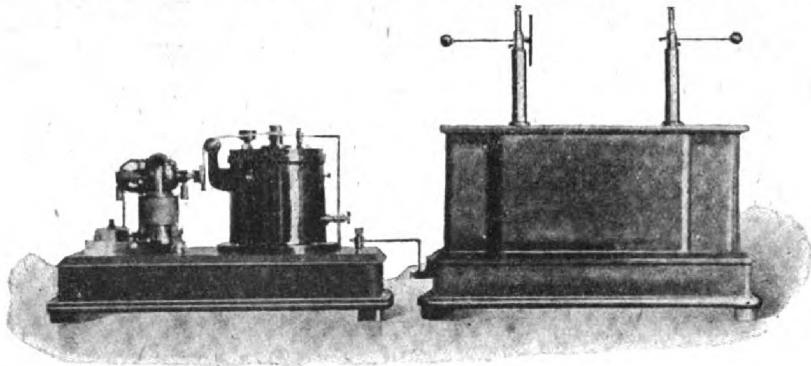
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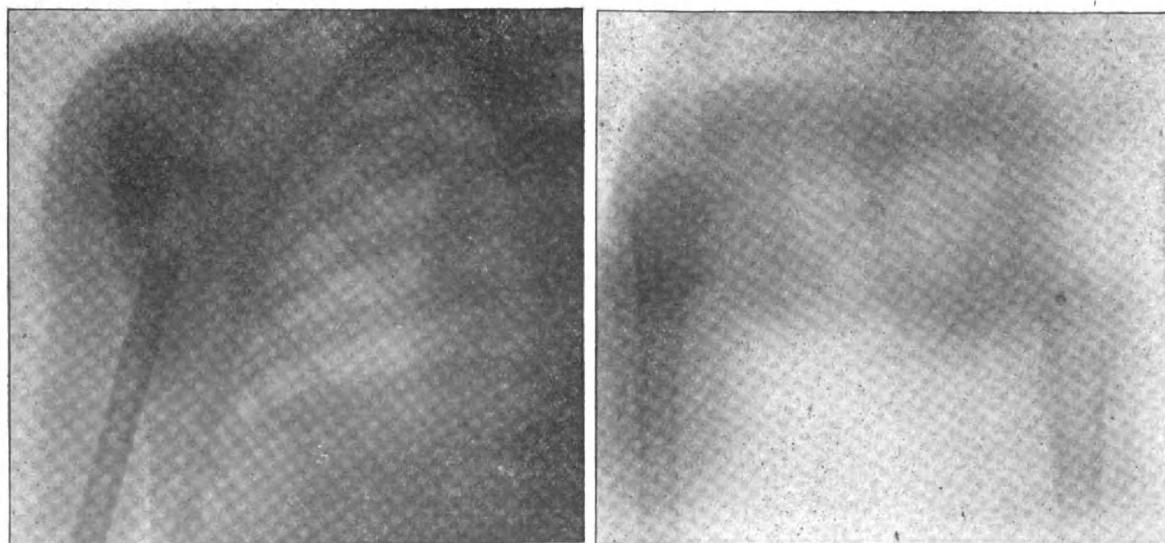
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FRACTURE OF UPPER ARM.
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FRACTURE OF HEAD OF FEMUR.
Time of exposure forty seconds.

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A MONTHLY JOURNAL DEVOTED TO THE MOST RECENT RESEARCH AND PRACTICE WITH ELECTRO-MAGNETIC AUXILIARIES, THEIR STRUCTURE, IMPROVEMENTS, ETC.

VOL. 1.

CHICAGO, JULY 15, 1901.

No. 2.

(Special to the American Electro-Therapeutic and X-Ray Era)
**THE SO-CALLED "INACCURACIES AND FALLACIES
OF THE X-RAY."**

BY EMIL H. GRUBBE, B. S., M. D.,
Professor of Electro-Physics, Radiography and X-Ray Diagnosis Illinois
School of Electro-Therapeutics; Lecturer on Electro-Therapeutics Hahn
Medical College and Hospital; Chief Radiographer Illinois X-Ray and
Electro-Therapeutic Laboratory. Member Roentgen Society of the
United States, also Electro-Medical Society of Chicago, etc.

It has been said that the use of the X-ray is insufficiently understood by the majority of non-professional people. I believe this to be the case, but I

feel mechanical and scientific training, in order to make a good radiograph, and, moreover, we must be practical physicians in order that we may be able to correctly interpret radiographs.

The science of radiography should certainly not be held responsible for the mistakes and shortcomings of indiscriminate and ignorant radiographers who work with inefficient apparatus and are unfamiliar with the subject—mere novices. These same doctors would not undertake to perform an amputation without hav-



Fig. 1.

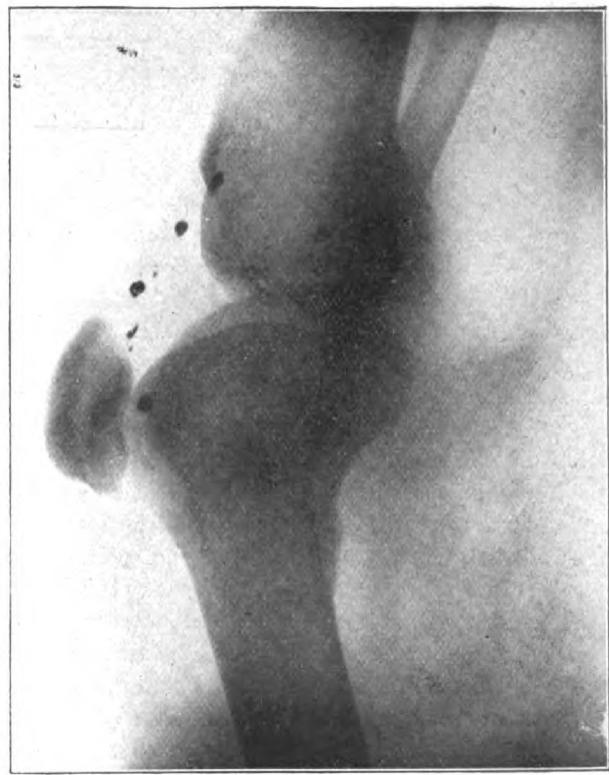


Fig. 2.

hazard the opinion that also a great many very active professional persons have an exceedingly inefficient understanding of the real value of the X-ray when properly used.

At the outset it must be understood that our sources of X-rays are exceedingly complex. Therefore we should not expect a person unacquainted with the sciences of electricity and medicine to get good results, simply because he chooses to supply himself with an outfit with which to work in this line. We need per-

ing previously studied the subject, yet they make efforts to take radiographs and know not what they do. The impossible may happen, but it is not probable.

If the X-ray is inaccurate it is our own fault and not that of the science, as many writers would lead us to believe. These writers rush into print and dare to write upon a subject of which they do not even know the primary principles. They exhibit pictures which never deserve the name because they show nothing—are simply blotches on paper and therefore have no

value. We have had such an abundant crop of these that it is time to put a stop to them. Some of these articles have been inspired by a deliberate purpose to propagate certain theories, but in the main they are the result of ignorance.

In this connection I believe as Dr. Heber Robarts has aptly said, "That a physician has no professional or human right to discuss the inaccuracies of the X-ray unless he understands its accuracies. If he only knew the evil effects of morphine he would do well to let the drug alone and the entire profession of medicine."

What, then, is required to make a good radiograph?

To begin with, it is, or ought to be, a well-known fact that a great many different factors must be taken into consideration when we wish to make a good and true radiograph. We need first an electric current of sufficient high voltage and amperage to properly excite a Crooke's vacuum tube, and, in order to take care of the great variety of objects and parts presented for radiographing, we must be able to vary both voltage and amperage at will. I wish to place emphasis upon the latter part of the preceding sentence.

We need next to pay our attention to the vacuum of the tube. I believe experience will bear me out when I say that those radiographers who make good pictures understand their tubes well; know what degree of vacuum is necessary for a certain part; what time to give for the exposure and the distance at which the tube must be placed from the body.

Personally I should say a proper understanding of the vacuum of a tube is of the greatest advantage and will do much toward removing the ferment of excitement pertaining to inaccuracies of the X-rays. If the tube is placed too near the body some distortion is bound to occur, and it seems to me a great many have failed to produce clear and distinct pictures because of the failure to observe this fact. It must be remembered that practically all the illuminated hemisphere of the excited Crooke's tube is throwing off rays and many of these are not at all times parallel or in a direct line with the body radiographed, and, unless we overcome this by placing the tube some distance away, distortion of the shadow on the plate must occur.

The position of the body X-rayed must also be ideal, and in cases of suspected fracture or foreign body, scientific method and instruments of precision are necessary to produce accurate results in a radiograph.

Next we come to the subject of development of the plate. Experience teaches that the best pictures are made from plates which have been developed by the radiographer himself. If you must send your plates to a photographer, you ought not to expect good pictures, because you have nothing to guide you in the future, and consequently you work blindly. As a rule most

photographers develop plates mechanically. They possess no knowledge of the chemistry of photography, and therefore are unable to overcome the many difficulties which arise, and poor pictures are the rule and not the exception. When an operator develops his own plates he can tell when he has made a mistake, he makes note of the length of time of exposure, the vacuum of the tube used and the current consumed, and future exposures are regulated accordingly. Manipulative skill derived from long practice, plus a knowledge of the chemical principles underlying photography, are necessary to get results. Considering this one subject alone, any person of ordinary intelligence can readily see how important is a proper understanding of the chemical development of the plate, for here the strictest attention must be paid to details, as slight deviation may produce dubious results. So that what we call inaccuracies of the X-ray should be called inaccuracies of personal work due to a vague knowledge of the business.

I am almost daily in receipt of letters from physicians who wish to know the formulas which I use in my work. Of course, there are no definite lines to draw. The personal equation enters here very largely, and one person may succeed with certain formulas while others, using the very same solutions, cannot duplicate the work. We must remember that all the conditions—the body, the current, tube vacuum, time of exposure, distance of plate from tube, developer, developing time, etc.—must be exactly the same to duplicate any radiographic work. There is no royal road to success in this line; experimentation and diligent work only will determine the method most suitable. Each method which may be recommended has its own special advantages and disadvantages.

Of late we read articles in the medical press written by carping critics, who, according to their knowledge exhibited in their writings, either do not read to keep up with the times, or cannot understand when they do read. It is amusing to those who have little difficulty in making good radiographs to read almost weekly that the value of the X-ray has been over-estimated in this or that direction. On the contrary, if these writers who have failed, not because of the fault of the X-ray, but because of lack of ability, actually saw good radiographs they would have to admit that the value of the X-ray had been under-estimated, and indeed could be considered indispensable in very many cases.

A short time ago an article appeared in a medical journal purporting to give special attention to original investigation along X-ray subjects with illustrations. Even one most ignorant of X-ray methods on reading this article would put the author down as one who neither knew how to write nor was able to do original research work if he tried. Such persons make veritable asses of themselves when they launch out upon

the sea of authorship, and write upon a subject of which they know nothing. The possession of an X-ray outfit does not necessarily make good radiographs.

Basing my conclusions on my own experience and on reports gleaned from the extensive literature on this subject, I venture to say that the reluctance of the average physician to give the X-ray full credit must be explained entirely from the standpoint of inexperience of such writers. And thus is raised the cry of X-ray fallacies, inaccuracies and misinterpretations.

I maintain that the X-ray is a positive means of diagnosis, providing in the first place you are intelligent enough to apply it, and in the second place are able to correctly interpret the resulting radiograph, for which a knowledge of anatomy and pathology are indispensable. Even with these preparations it must be admitted that there are failures with the X-ray. But there are failures also with other diagnostic agents —nothing is infallible. Was there ever a physician who never made a wrong prescription, or a surgeon who never made a wrong diagnosis or a wrong cut?

The sum and substance of all this means that we must have specialists in this work, for otherwise we shall always be in the dark. Physicians buy outfits knowing little or nothing about the physics of mechanics or electricity. How can we expect results? A person who knows very little about electricity should not expect to make correct radiographs any more than he could interpret heart sounds with a stethoscope before he took a medical course. The unfitness of the general practitioner to do the best X-ray work without special knowledge of electricity and electrical apparatus is shown by the number of articles of a contradictory nature which appear from time to time. I predict that ultimately X-ray work will be done only by specialists. The specialist in this line of work differs from the general practitioner who uses an X-ray apparatus occasionally, because, being a specialist, he devotes his whole time to this particular subject. He makes many exposures, has more complete apparatus and unlimited experience with a great variety of conditions, consequently he gets more uniform and accurate results. He standardizes his knowledge and develops a technique which only long experience can give.

During the past few years the profession has been more or less carried away by the X-ray method of diagnosing, and unscrupulous persons have entered the field and brought discredit upon the whole subject, which it certainly does not deserve, and it is a deplorable fact that the importance of the X-ray has not yet been realized by the profession at large.

I do not wish this paper to be considered personal, neither is it intended to elicit any unpleasantness among the profession. I only care to present a side

of the subject which, to my notion, has not been dealt with.

I trust that I do not expose myself to the charge of egotism when I present with this article two pictures to illustrate what detail and definition we can get if we use correct methods.

In conclusion let me say, in order that the calamitous cry of the fallacies, inaccuracies and misinterpretations of the X-ray may become a thing of the past, that I plead for more care in the selection of apparatus and proper working of the same if the physician must do his own radiographing and picture making; and above all I plead for more enthusiastic support of the specialists, who are physicians and practical electricians, and who give their whole time to this subject, who make proper application of experience, and who are, therefore, able to correctly interpret the radiographs which they make. Then we shall find nothing more accurate in diagnostic medicine than the X-ray.

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RADIOTHERAPY IN TUBERCULOSIS.

By GORDON G. BURDICK,
Associate Professor of Surgery, Post-Graduate of Medical School.

It is with extreme reluctance that I am induced to report on my experience with the use of radiotherapy in tuberculosis, because my experiments are not far enough advanced to become conclusive; and the fear that a very promising method of treatment in this terrible disease may be done to death before the fundamental principles are sufficiently understood to insure success. From out of the general chaos of knowledge about the ray one fact stands out preeminently, and that is the fact that the Roentgen ray will arrest tuberculosis in organic tissue.

Another fact should not be forgotten, and that is that the ray will kill organic tissue if not used with extreme care; and the borderland between its medicinal power and its destructive action is so narrow that a very fine discrimination is necessary in its application to receive its full value and not its destructive action.

It should not be forgotten that we are dealing with a force that is little known, and one that requires great skill in its use and very efficient apparatus in order to prevent doing harm to our patients if we decide to use the ray in the treatment of disease. The enormous number of so-called burns reported all over the country would go far to indicate that good judgment is the thing that seems to be wanting. I have made over 3,000 exposures and have never had any trouble as yet, and that seems to be the experience of all men who have made it a hard study.

It is a fact that certain low tubes will invariably cause irritation, and they are almost invariably found among the cheaper class. Generators that are irregu-

lar in their action will develop the dangerous ray, and great care is necessary in their selection. It should not be forgotten that the Roentgen ray is an intense ray from the chemical end of the spectrum, which exists in the solar spectrum in small quantities, and by artificial means is produced and intensified a million times by our method of generation and made available for practical use.

This can be proven by anybody that cares to take the trouble by constructing a large condensing lens and fill its center with a violet solution, when, on exposure of a plate wrapped into light proof holders, it will be found that a very satisfactory radiograph can be made at the focus of the lens. A prolonged exposure is necessary to obtain success.

We have not succeeded as yet in devising any reliable means of measuring the intensity of the ray, but it seems that shortly a satisfactory means will be found; the ray has the same action on selenium as light, and clumsy attempts have been made to measure its strength by using the Wheatstone bridge and measuring the electrical resistance of the metal while it is exposed to the ray. The principal difficulty so far has been the temperature factor and the expense of the apparatus, to say nothing of the skill required to use it properly.

A few facts are known definitely in regard to the Roentgen ray:

1. That it travels in straight lines.
2. That it passes through most substances.
3. That it passes through a complex substance, according to density of its component parts.
4. That it causes a chemical change in its passage through susceptible substances.
5. That it is destructive of organic life if used long enough.
6. That it is an efficient antiseptic in the presence of an organic substance.
7. That it has pronounced analgesic properties.
8. That certain salts will absorb it and fluoresce.
9. That it will decompose certain salts.

My attention was first called to the possibilities of its use in tuberculosis three years ago by the relief that was found by the patient on making a radiograph of a tubercular knee joint. I made an exposure of ten minutes with the inefficient apparatus then in use, and got a good negative, but the surgeon wished a different view and I repeated the exposure four days later. The patient claimed that he had the first relief from pain he had experienced for many months. Two weeks afterward he came back and begged for another exposure, and after a consultation it was refused. The subsequent history will be found later on.

This case set me to experimenting on a few cases of tubercular joints that came to my clinic, and I found that one injection of iodoform emulsion and subsequent treatment with the ray usually was followed by

immediate improvement and a subsequent recovery. It might be mentioned in passing that iodoform fluoresces beautifully under the ray.

A bad case of pulmonary tuberculosis presented itself at this time. He had been under treatment for a number of months at the clinic, and was getting so weak that it was only with the greatest difficulty that he could get to the hospital. And he was very anxious to have a radiograph taken of his lung, and to humor him I took it; and he came back and asked me to use it again, as he had felt better than he had for some time. I had him come twice per week and take treatments, not expecting it would do him any good. No special change was noted until he had taken six treatments, when his cough left him and his temperature became normal. When he took his tenth treatment he reported that he had gained twelve pounds in weight and had been working for a week: the subsequent history will be found in the report of the case.

I will report briefly a few of the cases that I have treated with the ray. They are fairly representative of the whole number of 13 cases of pulmonary and five cases of joint tuberculosis that I have submitted to the ray treatment. It is of interest to say that they are all enjoying good health at present and pursuing their various vocations as if they had not suffered from the dread disease. As yet no relapses have been noted, but are being carefully looked for and will be promptly treated if noted.

Case 1. John M., age 26, single. Met with an accident July 10, 1896, by falling off a wagon, and as he went to work the next day he apparently did not meet with an injury. Aug. 20, 1896, he found that his knee joint seemed to be weak and he had difficulty in using it, and it grew steadily worse until he could not bear his weight upon it. The joint became swollen and painful on pressure, and a marked atrophy was noticed of the muscles. He consulted an eminent surgeon and a diagnosis of tuberculosis was made and he was advised to have iodoform injected into the joint. He submitted to eight injections without stopping the process, and then had the leg put up in the plaster for four months; and when it was removed it was so bad that an amputation or an excision was advised, and he was sent to me to determine by means of a radiograph, which would be advisable.

Two radiographs were taken of the joint four days apart, and the exposure was ten minutes each time with the apparatus then in use; and the patient claimed so much relief that he begged for further exposures, and after a consultation with the surgeon it was refused. It is interesting to know that the patient did not receive any more treatment of any kind, but recovered the use of his joint in about four months and at the same time his health and is working every day driving a team.

Case 2. Wm. F., age 28, married, pulmonary tuberculosis. Had been under treatment for four months and was steadily growing worse. Temperature 101-5, severe cough, sputa contained tubercle bacilli and streptococci; he had night sweats and a profuse diarrhoea. Treatment was given at his request and with no hope of success. Treatment was given twice a week with a very high medicinal vacuum tube. No special improvement was noticed for four weeks, when he began to slowly improve and gain in weight, slept better, sputa lessened in amount and became more liquid and contained less bacilli, and the fever gradually left him, until at the end of ten weeks he was discharged; and although a few bacilli are found occasionally, as far as can be told he is in good health and working every day.

Case 3. Margarete L., age 24, widow, one child, poorly nourished. Developed pulmonary tuberculosis five months previous to consulting me, when I was called to see her for a severe hemorrhage from the lung. Both lungs were involved and the bacilli tuberculosis were found in great quantities. She was so feeble and exhausted that it did not seem that there was even a remote possibility that she could recover. It took two weeks of careful nursing to bring back strength to allow her to ride to my office for treatments. And the first two calls were made in a cab. She subsequently came on the street cars, as she improved. After six treatments I put her on tonics, when the improvement was rapid. She increased in weight from 93 pounds to 118, the most she ever weighed.

She has resumed her place as a waitress in a restaurant and works twelve hours per day and has been doing it for months. I have been able to find tubercle bacilli only twice in the last year.

The above cases are a fair sample of the rest that I have treated. I don't claim that they are cured by removing all the bacilli from their systems, but I do claim that they have regained their normal health.

No one is in a position at present to say just what takes place in the human tissue during the passage of the ray, and as yet we have only some plausible theories to offer and which are given for just what they are worth.

Theory 1 assumes that the tubercle bacilli are of less vitality than the human tissue, and the actual death of the germ takes place.

Theory 2, that the passage of the ray through the tissue brings about a chemical change that arrests the growth of the germ, but not necessarily causes its death.

Theory 3, tonic effect, by stimulating the normal cells to increased activity.

Theory 4, that the passage of the ray produces electrolysis and causes the tissue to become acid or alkaline as desired. I am very much in favor of the

second theory, as it is a fact that tubercle bacilli may be occasionally found after the patient has apparently recovered.

In conclusion I would again repeat the warning about overdoing the thing, if you decide to try this treatment, as I am positive that you will have occasion to regret if you are reckless; and don't expect to find many medicinal tubes among the cheap kinds that are sold with the apparatus today, or you will be disappointed. Burns are usually produced by low vacuum tubes, and carefully looking over the literature I find that it takes about forty minutes' exposure to produce one that is of any consequence, and any physician that finds it necessary to make an exposure of that length had better devote his time to other channels, as he will never succeed as a radiographer.

3000 Michigan Ave.

(Special to the American Electro-Therapeutic and X-Ray Era.)

X-RAY DIAGNOSIS FOR RENAL CALCULI.

BY DR. BYRON ROBINSON.

I wish to add my testimony to the great value of the X-ray in the diagnosis of renal calculi. Every surgeon knows how uncertain the diagnosis on this disease is by ordinary means. In fact, the operation on the kidney amounts to an experimental exploratory and confirmatory incision; besides, the surgeon should have some record for protection when an operation is performed on the same. To test the efficiency of the X-ray on renal calculi I recently diagnosed this disease in four consecutive patients, and subsequently sent them to my colleague, Dr. H. P. Pratt, for confirmation by an X-ray before operation. In the four cases the X-ray showed renal calculi, and the operation proved it to be true in every case.

I can highly recommend the X-ray as an aid to diagnosis in renal calculi. I believe as the X-ray becomes more thoroughly perfected and the interpretation of shadows better understood that it will be an excellent aid to diagnosis in this disease.

Chicago, July 15, 1901.

We have the doctor's promise of a larger paper on this subject, with illustrative cuts, in the near future.

NOTICE.

The next meeting of the Chicago Electro-Medical Society will be held on Tuesday evening, July 30, at 8 o'clock p. m. at the Balcony Clubroom of the Palmer House. The society extends invitation to the medical profession, urging their attendance. We hope that the profession will readily respond to this request, especially as a paper will be read, entitled "Electro-Diagnosis," by the president of the society, the eminent Dr. S. V. Clevenger. Discussion to follow.

(Special to the American Electro-Therapeutic and X-Ray Era.)
WHAT IS MEANT BY A HARD OR SOFT X-RAY TUBE.

BY DR. H. P. PRATT.

There has been a good deal published in the scientific journals about the hard and soft X-ray tube, and I question very much that not many of the readers understood these terms.

The hard and soft tube is the same as a high and low vacuum tube. It must not be forgotten that the X-rays are produced by the bombardment of the molecules of residual gas against the inner surface of the tube. The number of molecules or residual gas in the tube determine the degree of vacuum, as to whether it is a hard or soft tube.

The X-ray when excited acts in a similar manner to a condenser or leyden jar. It discharges in one direction, the outer surface of the tube becomes electro-positive, while the inner surface is electro-negative.

The tubes as a rule are excited from the terminals of the Ruhmkorff coil or the static machine. It is the secondary current which excites the tubes. The current is established through the medium of the molecules of the residual gas in the tube, thereby connecting the cathode with the anode. Each oscillation in this circuit causes the molecules of residual gas to bombard the inner surface of the tube, which point of impact is the source of the X-ray.

When the tube is excited some of the molecules of the residual gas are thrown from the cathode side of the tube, striking the platinum disc or anode, which serves as a target, causing the molecules to rebound, striking the inner surface of the tube. This point of impact on the inner surface of the tube, as I said before, is the source of the X-ray. Every molecule of gas striking the inner surface of the tube causes one or more lines of magnetic force to be thrown out with each impact at right angles to the surface of the tube. The distance in which the lines of force are projected, or, in other words, the limit of the penetrating power of the ray, depends entirely on the potential of the tube, and this in turn depends on the force of impact of the individual molecules of gas. The higher the vacuum the less the number of molecules of residual gas in the tube, the greater the free path, the higher the potential the greater the penetrating power. The lower the vacuum, the greater the number of molecules, the less the free path, the lower the potential, the less the penetrating power.

All substances over which the X-ray passes form part of the X-ray circuit.

The X-ray circuit is the same as any other electrical circuit. It has its return, forming an endless chain of molecules arranged in series. The higher the potential the greater number of molecules added to the chain, the larger the chain and vice versa.

The circuit is formed first from the point of impact on the inner surface of the tube, being directed out-

ward until the potential drops, then returning to the tube through the terminals.

Remember the X-ray is electro-static in character, an accumulation of lines of magnetic force of high potential and short wave lengths in a circuit, they decompose every substance capable of being decomposed in their path, and render every substance over which they travel a conductor of electricity.

The light which is emitted from the tube is the result of the decomposition of the molecules in the atmosphere surrounding and inside of the tube. This light is not the X-ray current. The X-ray force is purely electrical and is invisible.

The softer the tube (limited) the greater number of lines of force are thrown out and the stronger the X-ray current, which increases decomposition.

The harder the tube the less number of lines of force thrown out, and consequently the weaker the X-ray current the less the decomposition.

For good therapeutic effects use soft tube, increase and decrease primary current to suit the case, but be careful to avoid X-ray burns. The ordinary hard tube will not burn.

Dr. Straeter, Germany, asks: What part do the tubes play in the therapeutic treatment of disease with X-rays?

The doctor has found a great difference in the action of the X-rays upon the skin as to whether a soft or a high vacuum tube was used; for instance, in the use of a soft tube the exposed skin would become reddened after a few treatments—that is, reaction would take place; while in using the high-vacuum tube the reaction would either appear after a great many exposures or not at all. Accordingly, whatever pathological process, whether in regard to the epidermis or deeper laying disease is to be treated, it is necessary to have the proper vacuum of the tube. In epidermis a soft vacuum tube, for deeper action a medium vacuum tube should be used. Extremely high vacuum tubes are not good for any treatment.—(Deutsche Med. Wochenschrift, 1901, No. 34.)

Our editor says: Our own experience bears out the theory of Dr. Straeter. It goes without saying that the construction of the tube, and mainly its vacuum, is a most important factor in X-ray treatments of diseases. There is no doubt in our own mind that the effect of the vacuum upon the treated parts, needs more careful study and development.

The Roentgen Society of London recently offered a prize of a gold medal to the manufacturer of the best X-ray tube. International competition was invited. All tubes to be delivered May 1, 1901.

We are just informed that the above prize was awarded to Mr. Mueller of Hamburg.


Personal Letter to the Medical Profession

Dear Doctor:

In the beginning of any new enterprise, there is of necessity a large outlay of expenses before the enterprise becomes self-sustaining, and especially is this true of New Publications that are in special lines, such as this of the "AMERICAN ELECTRO-THERAPEUTIC AND X-RAY ERA," that ministers directly to the wants of the Medical Profession, consequently we feel justified in making a personal appeal for immediate subscription, and we base our appeal upon the stringency of our Postal Laws in regard to rates and definition of what is marked as "SECOND CLASS MATTER." To secure "Second Class Rates," we can not mail or even print more than double the number of regular subscribers. We print 10,000 copies, consequently need 5,000 subscribers to secure such rating; will you not kindly fill out the subscription blank attached, at once, and so give us the aid we need? With the growing interest in Electro-Therapeutics and X-Ray work everywhere manifest among Physicians, we feel that you need the "American Electro-Therapeutic and X-Ray Era," and we believe that you yourself feel the need of such a publication in order that you may be kept informed of the progress that is being made on this line, both in this country and in Europe, and only need this little reminder to comply with our request, and so aid us, that we may better aid you.

Respectfully yours,

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Tube and Archive of X-Ray examinations, Clinical Record and the discussions had upon the theory and practice in all its spheres of applied X-Ray radiography, when concisely and comprehensively stated by letters and designs. Such correspondence is respectfully solicited and will receive special care and attention.

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The Era will cover an extensive and exclusive field for makers and manufacturers of X-Ray appliances and Electric machinery, as the medical practitioners will be their best patrons.

TO OUR READERS.

In ancient mythology "Jove, the Father of Gods," was represented as holding in his hands the thunder bolts. This symbolism becomes freighted with significance in this new age of scientific discovery; for have we not discovered that electricity is the one primal element of all physical structure; its various phenomena appearing in all the manifestation of physics?

But in this connection I recall the saying of an ancient philosopher that "We must kill every god that we would make useful to us." I would, however, amend that saying by saying that we must subdue all the gods, (principles of nature), and having yoked them to the car of progress, make them our servants.

We all know of some of the electrical discoveries of the age, now in its dawning, as motor power, in telegraphy and such as these; but, too, do we not recognize everywhere in Electro-therapeutics and X-ray treatment the constantly increasing interest of the medical

profession? This interest is world-wide in its extent, and is by no means a "fad," to have only an ephemeral life; but is instead destined to remain, and, remaining, grow still more intense as the age develops, as all ages do, the ideas born to it.

With this thought in mind I take my place as editor of the American Electro-Therapeutic and X-Ray Era, hoping to add my mite to the efforts of others in this work thrust upon us of "subduing the gods," knowing well that if I succeed in this to my own satisfaction I must have the thoughtful aid of the medical profession everywhere. And I hope and believe that this aid will be given as freely as I have asked it; for the interest is a mutual one—we must work all together if we subdue Jove!

Fraternally yours,
 J. O. M. HEWITT.

MEDICAL JOURNALS.

Will you kindly place the AMERICAN ELECTRO-THERAPEUTIC AND X-RAY ERA upon your exchange list, and we will in turn send you our publication regularly with each issue.

MEDICAL SOCIETIES.

Kindly instruct your secretaries to inform us of your respective meetings, and furnish us with special items of interest to the profession.

THERAPEUTIC VALUE OF THE X-RAY IN TREATMENT OF CUTANEOUS DISEASES.

Dr. Hahn of the Institute of Alber, Schoenberg & Hahn, Hamburg, in his paper read before the medical society of Hamburg in November, 1900, stated that there was an increasing interest in the treatment of skin diseases by the use of the X-Ray; and introduced for their examination some of the patients who had been so treated.

In Dr. Hahn's statement of effects he placed in the foreground of this interest Lupus; but added that at the finish if the healing process did not advance as desired, he would use the Finsen's method (high light) if the patient had time for the slower process.

He also claimed to have treated with good results Eczema, Psoriasis Vulgaris, Lupus-erythematous, Rosacea, Favus, Sycosis and Hypertrichosis. He stated that "it goes without saying" that the treatment is alike beneficial for both acute and chronic eczema. The doctor demonstrated on a case of eczema in a young lady of seventeen who had suffered from it in malignant form since earliest childhood, satisfactorily proving a complete cure as the result of the X-Ray treatments. These diseases respond quickly to the Roentgen rays, particularly in the suppression after one or two treatments, of the itching that is the accompaniment of eczema.

Psoriasis plagues were equally benefited, he stated.

by the X-Ray treatment, the scales dropping off at from four to six exposures without the characteristic bleeding.

Of Lupus Erythematosus he reported three cases. Of these two cases were positively cured; of the third he could only report apparent good results while treatment was continued, but the patient went away and the case was lost sight of.

In two cases of Rosacea, the cures were at least long-lasting, if not complete, as there had been so far no return of efflorescence upon the skin. In cases of reddening of the nose, the X-Ray seemed to destroy the germs at once. He said the triumphs of the X-Ray treatment have been marked in all diseases of the skin which, as a rule, accompany hair diseases, remarking that to cure the first it was necessary to remove the hair. In X-Ray treatment of Favus, Sycosis Parasitaria and Sycosis Nonparasitaria and Hypertrichosis he had obtained good results. Speaking at length, he remarked, that in the two cases of Favus mentioned, compared with cases otherwise treated, the preference was decidedly in favor of the X-Ray. In a case of Sycosis Parasitaria, in which positive cure was effected by the X-Ray treatment, the doctor stated, that after a few exposures the swellings the size of walnuts fell off, the hair disappeared and the inflammation went back, affection disappearing with the healing of the slight burning caused by the X-Ray. In the cases of Sycosis mentioned excellent results followed, though they had been persistent for from two to twenty years. In the specially demonstrated case, the affection had been existing for six years. The hairs were sticking in the inflamed follicles on both cheeks, chin and upper lip; the main parts between were red and infiltrated. After twenty-three treatments with the X-Ray an excoriation of the chin about the size of a nickel appeared, but quickly yielded to emollients applied. After the cure of the excoriation, the chin and cheeks appeared in an entirely normal state, though the upper lip remained slightly reddened. The epulotic results are unfailing and cure can be guaranteed.

Speaking of electrolysis for the removal of superfluous hairs and small moles, he said that while this might be done, with single hairs, yet where large spaces were to be treated it is entirely out of question, as the frequent treatments that were necessary to effect a cure causes a nervousness undesirable, to say nothing of the fear excited in the patient, caused by the pain following the connection of the current in electrolysis. And besides, while destroying the single hair, it increases the growth of the hairs surrounding. He then called attention to the fact that by that method there was always left a scar, while in the X-ray treatment there is no pain, and no danger, provided the reaction receives proper attention or is prevented; while it has also the merit of covering large spaces at once.

In the growth of hair, which occurs in from two to four months, the recidivation becomes less and less, until finally they will not grow again; the skin stays smooth and no scars or observable change appears.

It will be seen by our readers that the experiments of Dr. Hahn, as above narrated, are of practical value; and if not as exhaustive as we could wish, yet are to us hints to be followed, as we for ourselves would make scientific advancement. This the physician of today realizes as a necessity of his profession; and, too, the physician of America is by no means a mere follower of his European brethren; he has the skill and the nerve to go forward, and already is competitor for the honors of discovery and practical application of methods whereby best results are obtained. Yet by no means do we of America fail to give honor to whom honor is due and extend to Dr. Hahn our greeting of praise.

Doctor Baurath of Berlin, writes to us: "Gentlemen, I am very favorably impressed with the first issue of your journal. It covers a much wanted field and will give us of Europe a better opportunity to hear from our American colleagues. I will forward to you as soon as possible an article regarding my own experience in X-ray work. I furthermore assure you that I will take great pleasure in soliciting valuable articles from the most eminent physicians on the continent. I wish you good success for the future.

The fact that electricity with its almost endless molecules changes, is the physical basis of nature's phenomena, presents to the intelligent physician, no less than to the scientists in other lines of special work, subject for earnest thought and investigations in respect to its therapeutical value in treatment of disease, yet strangely, it seems until within the last few years to have received but comparatively little attention from the medical profession, though it has been in use in a kind of empirical way many years. As a rule, it has been left to those, not physicians; but who by one way and another have discovered that in some cases good results have obtained from its application, and these "good results" have been exploited, while the ill results, owing to the ignorance of the operators, have been suffered to go unheralded and so unknown. But gradually electro-therapeutics has come to be regarded as a science, and as such is appropriate study of all who would be thoroughly equipped for their life work as physicians. In other words, the intelligent "up to date" physician feels that he must not be empirical only; feels that he must know the thing he uses; and too, that he must with his science, supplant the ignorant one; and see to it that the public is protected from the malpractice of ignorance. What is needed therefore, is some medical journal of repute, where from month to month, cases may be cited and detailed descrip-

tions given, and especially as we now perceive the therapeutic value of the X-ray as well as that we have found its value in the diagnosis of disease. To give this information, and from the most celebrated physicians we have issued the American Electro-Therapeutic and X-Ray Era, and we feel that with our extensive correspondence both in this country and in Europe, we are prepared to supply this now felt need, and we believe that in our efforts we will serve not only ourselves, but the whole medical profession, and through these, mankind.

CHICAGO ELECTRO-MEDICAL SOCIETY.

The efforts of this magazine to secure the formation of an electro-medical society to promote the careful and thorough investigation of electro-therapeutics and X-ray uses therein have been crowned with success, as is indicated by the following paper giving official report of the formation of such society. Our readers will also notice that the organization has made the American Electro-Therapeutic and X-Ray Era the official organ of the society:

Official Report of the Meeting.

Pursuant to a call, issued for the purpose of forming a society for the advancement of scientific electricity as a medical agent, a number of the doctors of the city, among whom we mention Drs. S. V. Clevenger, G. G. Burdick, Emil H. Grubbe, A. W. Baer, H. P. Pratt and Richard H. Street, did convene on Tuesday evening, June 25, 1901, at 8:30 o'clock, in the office of the Illinois School of Electro-Therapeutics, 1302 Champlain Building, Chicago, Ill.

The meeting was called to order by S. V. Clevenger. On motion Richard H. Street was appointed secretary of the meeting. On motion the chairman appointed the following committee—Drs. Burdick, Baer and Pratt—to formulate a plan of action. The committee reported that the officers of the society should consist of a president, two vice-presidents, a treasurer and a secretary; also an executive committee of five members, publication committee of three members, committee of scientific research of five members, and a membership committee of three members. On motion the following officers were elected to act until the annual meeting:

S. V. Clevenger, president.
J. E. Farnum, first vice-president.
J. E. Gilman, second vice-president.
G. G. Burdick, treasurer.
Richard H. Street, secretary.

Motion by president that the society be known as the Chicago Electro-Medical Society. Carried. Motion made and carried that the date for the annual meeting be Tuesday, December 3, 1901. Motion that the first regular meeting of the Chicago Electro-Medical Society be held Tuesday, July 30, at 8 o'clock at the Palmer House. Moved that Dr. Clevenger be re-

quested to read a paper at that meeting. Dr. Clevenger accepted and promised the society a paper on Electro-Diagnosis. Moved that the secretary be instructed to send a notice of this meeting to the editors of the Journal of the American Medical Association, Chicago Medical Times, the Clinique, Chicago Medical Recorder and the American Electro-Therapeutic and X-Ray Era. Motion by Mr. E. H. Grubbe that the American Electro-Therapeutic and X-Ray Era be made the official paper of the society. Carried.

On motion the meeting adjourned.

RICHARD H. STREET, Secretary.

Dr. Stenbeck of Stockholm has not only treated lupus with X-ray, but also cancrite. The first case of this dreadful disease was a very deep-lying epitheliom of the nose, while the second was a common typical cancrite in the shape of an E.

The treatment with the X-rays took place every day, and judging from the photographs shown to demonstrate the cases the results were very good.—(Fortschritte auf dem Gebiete der Rontgenstrahlen.)

The success achieved in the treatment of some diseases by the high frequency, or chemical, rays of the electric arc light is attracting the attention of many persons in various parts of the world.

Experiments have demonstrated, it is said, that the rays destroy, among other things, the bacilli of tuberculosis and cause dilatation of the capillaries, with corresponding changes and increased nutritive activity.

Some of these experiments in phototherapy, especially those made by Dr. Neils R. Finsen of Copenhagen, have aroused wide-spread comment. He is the inventor of the tube which bears his name. In New York a number of physicians are using the Finsen tube and other apparatus for the purpose of treating certain diseases.

In the Finsen light department of the London Hospital the number of cases treated each day is about one hundred. Queen Alexandra was instrumental, it is said, in having this method of treating certain diseases tested in the London Hospital.

Among the hundreds of cases of freak hands or feet which have been discovered and recorded by Professor Frederick Starr of the Anthropology department of the University of Chicago are fifty minute descriptions of Chicagoans who have either too many or too few fingers and toes. Professor Starr made another appeal to the members of his class for the names and addresses of people with superfluous members. He announced that it was his purpose to get full data upon 500 cases and then he would begin to formulate a new theory. Already he has records for 350 cases, some of the subjects having six,

seven and even nine fingers or toes on one extremity. Among the observations which he has already made is one to the effect that such deformities are more common in large than in small families.

DISCOVERY OF A NEW DISEASE AND THE MICROBES PRODUCING IT.

Honor to an American Physician.

The French Academie de Medicine has just paid an American doctor the greatest compliment in its power. Dr. C. J. Koenig, formerly of San Francisco, who has become widely known as a specialist in throat and nose diseases in Paris, has been asked to communicate to the academy at tomorrow's session the details of his double discovery of a new kind of sore throat and of the microbe that produces it.

Dr. Koenig, who will respond to the honor conferred on him by giving the academy the whole fruit of his labors, furnished an account of the discovery.

"The patient who was the indirect cause of my discovery," he said, "was a man 35 years of age and in perfect health, with the exception of being subject to chronic rheumatism. The trouble began two months ago with a form of superficial ulceration, covered with a grayish false membrane in the upper part of the right tonsil. The only symptom was a slight pain in swallowing. There was no fever, no headache and no gastro-intestinal ailment.

"In spite of all treatment the affection spread to the mouth in the form of superficial erosion, covered again with false membrane, which invaded the palate, the cheeks and even the tongue.

"After many weeks of close study and investigation I discovered a bacillus to which I have given the name 'bacillus polymorphus' on account of the remarkable variations in its size and shape.

"It is immobile, differing from all other bacilli in cultural properties and susceptibility to colorations by aniline dyes. It is non-pathogenic, since guinea pigs do not die when hypodermically injected with the culture."

The new disease has been given the name, "Eroso Membraneus Angina." The medical profession of Paris is manifesting the greatest interest in the exposition of the subject.

Since writing the above we find this item in the daily press:

Chicago Doctors Doubt the New Disease from Paris.

"Eroso membranous angina," the new throat trouble which Dr. Koenig, late of San Francisco, says that he discovered in Paris, is not alarming the physicians of Chicago appreciably. Dr. Koenig says that an entirely new variety of germ, which he has named "Bacillus polymorphous," causes the disease. It appears that "eroso membranous angina" is gravely

suspected of being an old friend, pharyngo-mycosis, masquerading under an alias.

Dr. Arnold C. Klebs, the throat specialist, 147 Lincoln Park boulevard, Chicago, said he had never heard of Dr. Koenig, adding: The disease described in the interview does not show any extraordinary new features. To judge from the description it may well have been a pharyngo-mycosis, a rare local disease, though well recognized. The non-pathogenic germ Dr. Koenig claims to have found may have nothing to do with the disease."

Dr. Adolph Gehrmann, the city bacteriologist, said the new disease might well be pharyngo-mycosis. Until the germ shall be proved to be pathogenic, or disease-causing against the human frame, it cannot be reckoned important as a discovery, said Dr. Gehrmann, who also had never heard of Dr. Koenig.

Dr. H. S. Gaylord of the University of Buffalo states that cancer is caused by an animal parasite which has been identified and isolated. He has been investigating the cause of cancer for two years as head of the New York State Pathological Laboratory. He has inoculated animals with cancer germs, and cancer afterward developed in the animals. Cultures of these organisms have been injected in the abdominal cavities of other animals and they recovered, having apparently grown in the serum of the animal.

Experiments with X-Ray have proven that the cancer parasite has been successfully treated by the Roentgen Ray and marks the beginning of a new era in combating this dread disease.

At the request of Dr. L. K. Hunter, one of our representatives called at his office to be shown a new device in lighting a miniature lamp with static electric current, which up to the present time electricians have considered impossible. The doctor has experimented for some time along this line, and finally succeeded in accomplishing the desired result. He attaches two terminals of a small box (the inner construction of which as yet is his secret) to the static machine and the other two to the lamp, when the static machine is put in action the little lamp lights up with the usual brilliancy.

The doctor thinks this construction of sufficient value to have applied for patent rights.

In the August number of this Magazine there will appear an article from F. H. Blackmarr, M. D., on Lupus Vulgaris, which, we believe, will be of special interest to the profession.

Doctors—Please do not forget to send us your subscription for the American Electro-Therapeutic and X-Ray Era.

G. E. Fosburg, M. D., of Cedar Rapids, Iowa, says: Your journal is quite a fit of X-ray work. Will send you some interesting literature if desirable.

Doctor, we thank you for your compliment, and would be glad to receive your communications at your earliest convenience.

E. A. Florentine, M. D., treasurer of the Roentgen Society of the United States, Saginaw, Mich., says: I am pleased with the first issue of your monthly and wish you much success in the future.

A. B. Slater, secretary and treasurer of the Illinois School of Electro Therapeutics, says: We are in receipt of inquiries daily regarding articles in the American Electro-Therapeutic and X-Ray Era. This shows that the Era, not only reaches, but attracts, the attention of physicians interested in our field of therapeutic research. As an advertising medium it is A No. 1.

Frank S. Betz & Co., 37 Randolph St., Chicago, say: Last month we placed our first advertisement in this journal and from the number of replies we received it shows that the doctors know a good thing when they see it, for letters come in from every state in the Union from physicians who want information regarding the little ad in the American Electro-Therapeutic and X-Ray Era.

H. C. Bennett, M. D., of Lima, O., says: We have received your initial number of your new journal, which we have examined with interest, and we congratulate you upon its appearance, and wish you all success, and welcome your journal to the field of electro-therapeutics, which needs a few more good publications along this line.

Professor Koch of Berlin, the discoverer of the phthisis bacillus, will startle the medical and scientific world by the announcement that bovine tuberculosis cannot be transmitted to the human system.

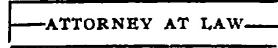
The famous bacteriologist, authorized the statement that he has demonstrated that the meat and milk of cattle infected with tuberculosis may be consumed with absolute impunity.

He says: "I have reached the conclusion that mankind's fear of contact with tuberculosis-infected flesh and fluid is unnecessary and unfounded.

"I arrived at the discovery through what I consider practically indisputable tests. These experiments lead me to believe that human tuberculosis and bovine tuberculosis are two entirely distinct species.

"I have found the human tuberculin incapable of inoculation into the animal system. Proceeding from that premise, I am prepared to show that humanity's far-reaching precautions against infected cattle may once for all be abandoned."

HENRY M. SELIGMAN



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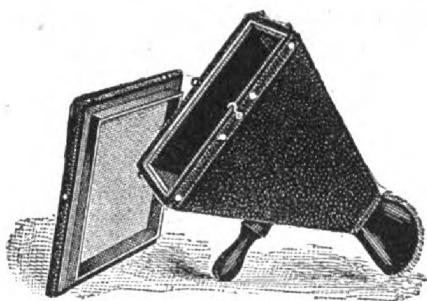
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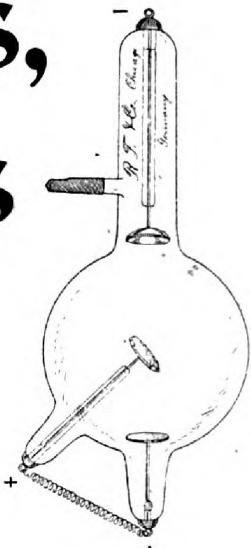
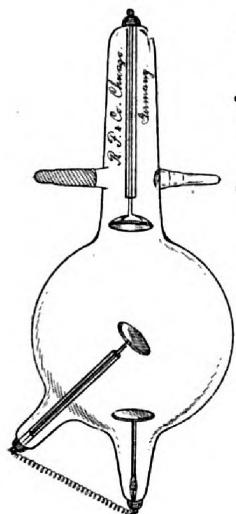
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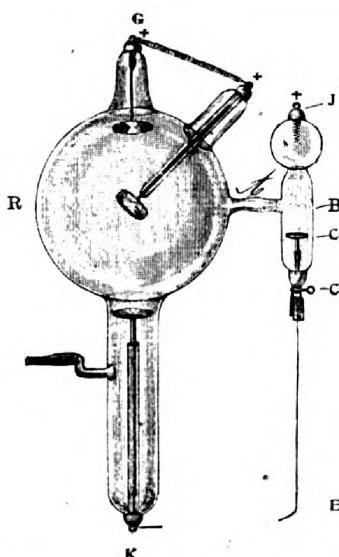
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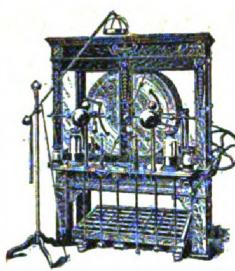
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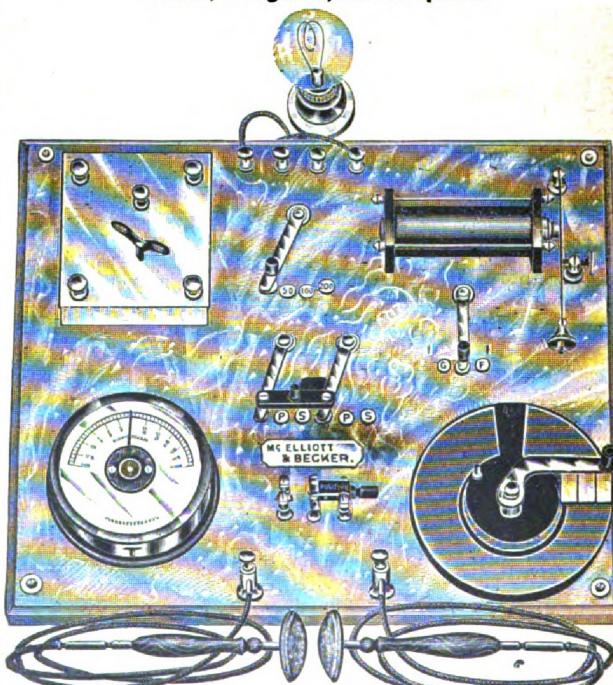
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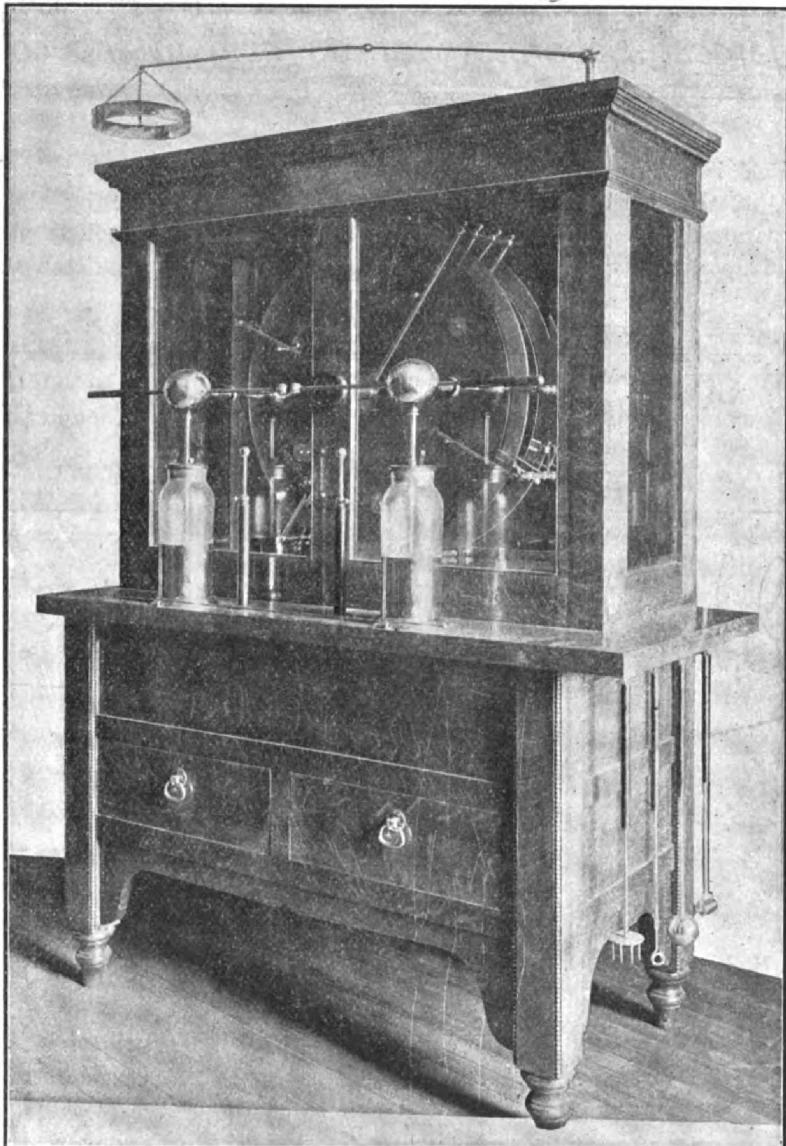
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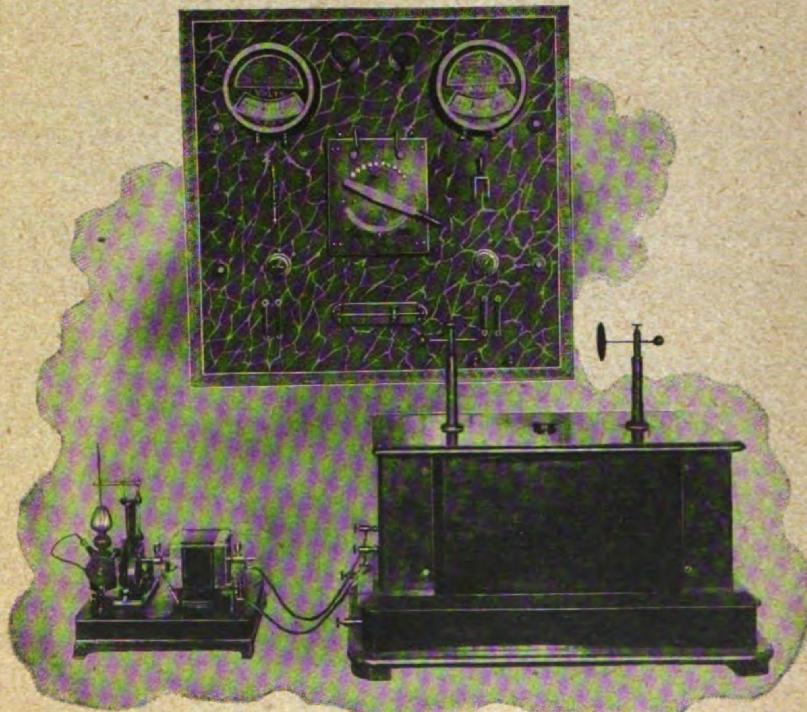
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AMERICAN Electro-Therapeutic and X-Ray Era

A MONTHLY JOURNAL DEVOTED TO THE MOST RECENT RESEARCH AND PRACTICE WITH ELECTRO-MAGNETIC AUXILIARIES, THEIR STRUCTURE, IMPROVEMENTS, ETC.

VOL. II.

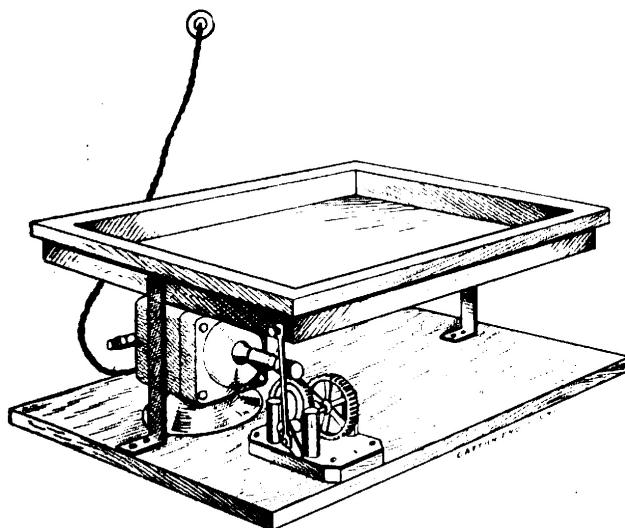
CHICAGO, JANUARY, 1902.

No. 1.

Special to the Electro-Therapeutic and X-Ray Era.

AUTOMATIC ROCKING TRAY.

The apparatus represented by cut was designed by Dr. Gordon G. Burdick, and presented to the Chicago Medical Society at its meeting in November, with the following remarks: The object of this machine is, to be a time saver in the developing of photographic plates. It has been known for some years that the average physician fails to get good results in the development of X-ray negatives due to various reasons, principally because of a dislike to spend sufficient time in the dark room to properly develop a negative.



He has compromised the matter by using an extremely sensitive photographic plate and a developer, very rich in alkalis, in order that he may complete his work in the shortest possible time and go from the dark room into the natural light. This process is responsible for the nasty muddy X-ray negatives which are seen everywhere. The proper paraphernalia to get a first-class result in the X-ray negative is a slow plate, the most valuable because the plate is not so sensitive to the ordinary dark room light and contains in the emulsion more free bromide of potash, therefore it does not fog or veil so quickly as the ordinary plates which are used in process by emulsion. The quickness of the photographic plate is of no special importance when used for X-ray processes, inasmuch as the X-ray light passes directly through all

the emulsion which can be prevented by putting a great number of plates together, therefore if the physician expects the best results in X-ray work, isochromatic or extremely rapid plates are not suitable.

This apparatus which I have designed is automatic in its action, the plate, after exposure, is put into the tray, flooded in the usual manner and when the film is completely wetted it is set in the automatic rocking tray and a developer is used which gives a good printing contrast. It takes about one-half hour in the development for ordinary radiographs of the limbs, it is possible in radiographs of the trunk to prolong the development for an hour or two in order to give sufficient printing contrast to the ordinary trunk negatives. When a short exposure of the trunk is desirable prolonged development will yield a negative rich in detail and of sufficient printing contrast to give an excellent positive print.

The difficulty heretofore has been overcome by means of "tank development," where an extremely weak developer is used and the negative allowed to soak from two to ten hours, according to the part of body radiographed. The object of this method has been the tendency to deposit crystals upon the photographic film as well as staining the negative from prolonged contact with the solution. The negative developer by this method never produces the sharp crispness and brilliant detail obtained by the rocking method development.

The physicians whose time is valuable, has merely to take his plate; set it in the rocking tray and cover it up, go about his business and look at it from time to time if desired, without any detention in the dark room whatsoever, a little experience with exposure and the use of one or more developers for different purposes will quickly improve their technique until they arrive at a position where they can anticipate the complete development of the negative by this manner, consequently they may feel relieved of all anxiety as to the result.

The developer used in this method was rich in bromide of potash, which has a chemical restraining action over the developer in its action upon reduced metallic silver, therefore as a time saver as well as doing away with the bad air of an ordinary dark room, it is worth its weight in gold. The apparatus, as you see, is constructed of a tray mounted upon rocking arms, with a 1-20th horse power motor with a reduction gear

and rocks the tray by means of an ordinary well known eccentric motion. The tray is not supposed to contain a plate but is for the use of ice in hot weather. The tray containing the photographic negative to be developed is set on it, thus keeping the developer at a proper temperature and preventing the frilling or fogging of the plates in the process of development from the high temperature.

In cold weather warm water may be used instead of ice for the tray, thus if the dark room is unusually cold development can be kept at a proper temperature of about 65 degrees Fahr., to give the sharpest and crispest deposit.

**CRITICISM OF A STATEMENT MADE BY
DR. W. A. PUSEY.**

(Paper read by Dr. H. P. Pratt before the Chicago Electro-Medical Society, followed by discussion.)

I notice in the December number of the American X-Ray Journal a letter from Dr. W. A. Pusey of Chicago, in answer to a letter of inquiry in relation to a reprint of his published on the X-ray in the treatment of skin diseases, in which he discourages the use of the static machine for X-ray work in treating acne, hypertrichosos, sycosis, etc., and gives reasons for the same. The following is a quotation from his letter in the Journal: "It is necessary that all the factors involved in producing the light (X-rays) be definite and that there be repeated exposures to a weak light, the effect of which may be controlled, rather than the use of a strong light for a few exposures. As I said in that paragraph, I use the technique suggested by Schiff and Freund, described in my previous article, in which the light is produced by standard current of twelve volts and one and one-half amperes and a coil of 30 C. M. spark length. I believe it is only by maintaining your factors definite and using a weak light that you can pursue the method with safety in all cases. The light produced with the static machine is in quantities which are greater than is safe to use repeatedly for long exposures, and there is no way of accurately determining the factors in the production of light."

Such statements as these are misleading and misrepresent the facts, and physicians having a thorough knowledge of X-ray physics will bear me out in this statement. It is true that there is yet a good deal to be learned about the physics of X-rays, but if there is one thing that all experienced operators have demonstrated to a certainty, it is that it is impossible to maintain definite factors.

The force projected from the vacuum tube is electrostatic in character and of very high potential, it acts on matter in the same manner as any electro-motive force; that is to say, it produces a dissociation of

molecules along its line of force, which is electrolysis. The light which is emitted from the vacuum tube is the result of the decomposition of the molecules in the atmosphere around and inside the tube. This light is not the X-ray current, the X-ray force is purely electrical and is invisible. It appears to me that if we consider the X-ray as an electric current of very high potential which makes its circuit from the inner surface of the tube outward, perpendicularly to the surface, then radiates in straight lines until the potential falls, when the rays return to complete their circuit by the terminals, we have a simple and practically useful explanation of all the phenomena.

The X-rays are produced by the bombardment of the molecules of residual gas against the inner surface of the tube. The number of molecules of gas in the tube determines the degree of vacuum. When the tube is excited some of the molecules of gas are thrown from the cathode, striking the platinum disc or anti-cathode, which serves as a target, causing the molecules to rebound and strike the inner surface of the tube. This point of impact on the inner surface of the tube is the source of the X-ray. Every molecule of gas striking the inner surface of the tube causes one or more lines of magnetic force to be thrown out at right angles to the surface of the tube. The distance to which the lines of force are projected, or, in other words, the limit of the penetrating power of the ray, depends entirely on the potential of the tube, and this in turn depends on the force of impact of the individual molecules of gas. The higher the vacuum the less the number of molecules of residual gas in the tube, the greater the free path the higher the potential, and the greater the penetrating power. The lower the vacuum the greater the number of molecules, the less the free path, the lower the potential and the less the penetrating power. The force projected from the X-ray tube, being electrical, must follow Ohm's law. The current is equal to the electro-motive force divided by the resistance; that is to say, the potential of the tube may be measured in volts, the resistance of the X-ray current measured in ohms, the amount of current measured in fractions of an ampere, and the amount of work done measured in a fraction of a watt. To obtain the measurement it requires an expert physicist, the poor doctor is not in it.

So you will see there are three factors that enter into the problem of the X-ray current—the potential, the resistance, the current—with no one constant factor. They vary with each excitation of the tube, this variance is due to the degree of vacuum and the force of impact of the molecules of residual gas on the inner surface of the tube. With each excitation of the tube the vacuum increases, thereby changing the other factors, so that the main and almost the only factor is the degree of vacuum in the tube, and not the form of apparatus used in exciting the tube. The degree

of vacuum required varies according to the part being treated, and can only be determined by close observation of the working of the tube and the susceptibility of the patient to electrical influence. This is the whole thing in a nutshell. There is no one method that can be followed, you must vary the factors to suit the case. If Dr. Pusey is of the opinion that with a coil of thirty C. M. spark length, voltage of twelve and an amperage of one and one-half he can maintain a definite amount of energy in the tube, he is laboring under a misapprehension. He must study the tube factors first and vary the other factors to suit. While the amperage and voltage is for all practical purposes constant, the work that is being done is almost entirely confined to the tube, which is constantly changing the degree of radiation. The doctor has the cart before the horse.

The tube's radiation should be kept constant, as far as possible, by varying the force in the apparatus which energizes the tube. It must be remembered that the tube varies with each excitation, and consequently it requires an increase or decrease of the amperage on the primary circuit to keep the tube at a comparatively constant radiation. But this is absolutely impossible, as the vacuum increases every time the tube is excited, consequently changing the degree of the radiating energy. It must not be forgotten that the X-ray current produces an electrolytic effect on the tissues of the body; this electrolytic effect is increased or decreased according to the number of lines of force emanating from the tube.

All substances through which the X-ray passes form part of the X-ray circuit. When this radiating energy comes in contact with the tissues, it changes the relationship of the ions composing the same, producing an increased metabolism. The static machine can be harnessed up by an expert to produce the same results as the doctor obtains from his coil.

The doctor's criticism brought out considerable discussion. Mr. Friedlander was called upon to state his experience with X-ray tubes when operated by different coils and static machines. He stated that the same tube would fluoresce very differently when attached to different static machines. The same held true with coils.

Mr. Treadwell contended that Dr. Pusey's article must not be taken to claim that the quality of the X-ray he used for treatment was always the same, but only approximately so; that the doctor doubtless judged of the hardness of the tube by fluoroscopic views of the hand and by the color of the fluorescence of the tube, and that he thus satisfied himself that the quality of the rays did not change markedly during a treatment. All operators have to admit that no accurate and standard method for determining the quality of the X-ray has yet been devised.

In reply, Dr. Pratt stated that no such admissions

were hinted in Dr. Pusey's article, in which the amperage and voltage of the primary current was specified as well as the size and make of the induction coil but the kind of X-ray tube and its vacuum were not mentioned. This would give rise to serious blunders if neglected. The vacuum of the tube is the most important agent in determining the quality of X-rays given out. The low amperage claimed as sufficient to satisfactorily operate the coil and tube was declared insufficient by Mr. Scheidel.

Further discussion ensued involving Dr. Pratt's theories concerning the nature of electricity and the X-ray.

Mr. Treadwell argued that electrostatic lines of force, magnetic lines and the X-ray must necessarily be different in nature. For example, each metal has a definite specific resistance to galvanic currents; all substances have a certain permeability to lines of force but though on Dr. Pratt's theory the permeability and specific resistance would have to be of the same order this is not found true at all. The doctor also claims that the X-ray obeys Ohm's law. This cannot be affirmed because the specific resistance is not the same as the relative opacity of the different substances for the X-ray. For instance air, hard rubber, paper and wood, which are non-conductors for galvanic currents are from Dr. Pratt's theory called fairly good conductors for the X-ray as compared with metals which are poor conductors, that is opaque, to the X-ray.

In meeting these objections, Dr. Pratt made a black-board diagram of a tube and showed how the lines of force, that is the X-rays, proceed from the tube, journey through the air and return to the terminals.

Dr. Grubbe, while not agreeing with Dr. Pratt's theory of the X-ray, thought his criticisms of the article in the Journal very just.

X-RAY FREAKS.

By Prof. T. P. Hall.

(Paper read before the Chicago Electro-Medical Society.)

Pictures made by the Roentgen rays are shadows. Any dense substance placed between the tube (source of the rays) and the sensitive plate checks their action, leaving a lighter spot on the developed plate.

In some cases pieces of metal behind the sensitive plate produce the same effect as they would in front of it.

Dr. H. P. Pratt had noticed such phenomena some years ago. Some weeks ago he exhibited two developed plates, one of celluloid, the other of glass, each bearing a clear imprint of a flat brass spring that was behind the plate during the exposure. In each exposure the plate was in a holder, with woody fiber in front of the plate, and the spring, backed by more woody fiber, behind it. The print of the spring was lighter than the adjacent parts.

A glass plate was then exposed, film down, with Webster's unabridged and a few small articles on top, and a selection of articles on the oak table below it. The rays all went through the dictionary and the glass before reaching the film, which was protected by three coverings of black paper. The tube had a moderately high vacuum. Its center was fifteen inches above the plate; and the exposure was five minutes, with a fifteen inch coil and a vibrator of the old type.

A 25-cent piece, which was close below the plate, gave a distinct dark imprint. A small file, upon which the quarter rested, produced a light imprint along its whole length. A piece of type metal an inch and a quarter thick, upon which one end of the file rested, showed as a faint light spot with uncertain outline. Another 25-cent piece, which lay on the table beside the type metal, under the file and an inch below it, was faintly visible on the plate. A round-topped glass paper weight half under the plate appeared as a light arc enclosed by a concentric dark arc. A thick piece of boxwood corresponded in a position with an undefined darkening, and a nickel lying on it was distinctly seen as a light circle; but a flat iron key on the other end of the boxwood did not appear at all. A circle of nickelized brass and a cent, lying on the table from a half to one inch below the plate, were faintly visible; while a quarter inch glass tube, an iron wire, a piece of steel a quarter inch in diameter and a half inch high, a paint tube, a pocket knife, a thin tin plate and a pair of eyeglasses left no trace on the plate.

Another plate, of celluloid, was exposed seven minutes, film upward, enclosed in two black paper covers. Above the plate was a plate of vulcanite three sixteenths of an inch thick; and above this, covering parts of it, were pieces of window glass, lead foil and tin-foil folded in several layers. This tube was softer than the former and nothing showed through the tin or lead foil. A paper knife of heavy black wood also lay on top.

All the objects below were arranged so that some part of each was in contact with the lower side of the plate. The glass paper weight, a rubber stopper, a cent and a piece of lead foil were supported on a cushion in a square hole in the top of the table. Of these the lead foil alone appeared on the developed plate as a light imprint, and it was partly over the edge of the hole. Forming one side of this hole was an iron plate; and on an adjacent side a plate of window glass projecting two inches beyond the edge of the oak. This corner (wood and iron) was distinctly visible, the hole appearing lighter. A dime on the iron plate not covered by the glass above made a very dark circle. A nickelized brass paper knife in a similar position left no mark. A dime on a nickelized iron, covered by the upper glass, was distinct and dark; while the iron on which it rested was faint and light. The

file, which lay partly on the glass and partly over the hole, did not appear. A 25-cent piece, which lay on the glass over the edge of the wood and was covered partly by glass above and partly by the black paper knife, was very distinct, dark. The part covered by the paper knife was both absolutely and relatively darker than that covered by glass.

Later, on taking a radiograph of a head, Dr. Pratt found that the wires on a frame beyond the plate appeared distinctly at first, but as development proceeded they became very dim.

A number of other exposures have been made, sometimes with no result, sometimes with results similar to those described. The best back-action imprints have been obtained when there was a considerable thickness of material like paper in front of the plate, and wood behind the whole. An exposure of five to ten minutes is required, and a moderately soft tube.

The cause of the phenomena is still obscure. Reflection, direct or diffuse, seems insufficient as an explanation. The possibly existing rays of some other sort produced by the action of the X-rays on the objects do not make matters any clearer. The most probable explanation at present is that there is some sort of backing up of the X-rays, either on Dr. Pratt's view of the X-ray circuit as a sort of electrical circuit, which is affected by resistance in any part of it, or on the theory of longitudinal ether waves. Experiments are still in progress.

SOME PRACTICAL APPLICATIONS OF THE X-RAY IN FRACTURES AND DISLOCATIONS.

By J. A. Rock, M. D.

The X-ray has become a diagnostic agent in all fractures and dislocations. Any work on surgery without full credit to the diagnostic advantage of the X-ray, especially in this branch, would not be an up-to-date book. It is not necessary any more to speak about the value in fractures in honest surgical hands. It is not only valuable in corroborating the discoveries by the usual method of diagnosis, but at times we can discover lesions not recognizable by ordinary methods of examination. It is now an up-to-date diagnostic means within the power of every physician to be his own consultant and quite frequently correct his own mistakes, which would not, perhaps, be recognized until too late. It gives us a correct record of our procedure during the whole care of the treatment and may protect us in every case.

It was found that very early in the history of the X-ray that we had to deal only with the shadows, but by repeating experiments, research and experience, we are now able to photograph not only the shadow of bones, but the substance of the same, and do work that is more successful.

Much has been written about the fallacies of the X-ray, pushing aside the new method of diagnosis;

but how about the wonderful microscope and ophthalmoscope? You have to look until you see something. To the unpracticed eye, the microscope is much more liable to lead us astray than the very simple application of the X-ray. We had to study to practice medicine; we have to read to manage an individual case of typhoid fever; we have to look up our authorities to operate in a difficult case, etc.; and to manage the X-ray we have to study just as well.

It is very simple, indeed, to turn on the switch and produce the X-ray with the static machine, but it is more difficult to manage the same and to know just what to do in some cases, when the fundamental laws and principles of the electrology and radiology are not well understood. Let me state here that for this reason many mistakes in the beginning of the X-ray phenomena, attributed falsely to the X-ray, instead of the operator himself.

We must know our technique, our Crook's tube and the power of the X-ray; the distance of the tube from the object, which must be as near as possible to the part examined, and the shadows which are seen most beautifully correspond exactly with the radiation from the disk of the platinum in the tube; and make the angle at which the picture is taken. Work must be rapid, exposure short, and the patient well protected. To get a good picture from the X-ray we should know our case, anatomy, and keep the obliqueness of the X-ray in mind and make the skiagraph as nearly life size as possible. Then we will make skiographs which will be most wonderful indeed.

The bone relationships in joints, the various movements, direction of dislocation, fissure, depressions, separation of the splinter, the direction of the complete fracture, transverse, oblique, longitudinal, the seat of the fracture, as to the neck, head or shaft, compound or gunshot fracture can all be studied in a striking way with the help of the X-ray, and the different steps in bone development or repair observed. In regard to the callus formation, in many cases the X-ray tells us the truth and will teach us to do honest and successful surgery. When the proper position is known, the X-ray cannot mislead.

You may deceive the sense of touch, but not so easily the eye, which is absolutely unerring in its diagnosis. Some one has said "that in few cases of fracture the X-ray will give no information which we are unable to obtain by any other method, but in a large majority of the cases of fractures we are able, as said, to determine by physical examination the exact condition of affairs just as readily as we are able by means of the X-ray."

Most every surgeon will be surprised at such a statement, knowing that fracture of the styloid occurs in four out of five cases examined for Colles fracture. This condition of affairs never could be made out by

cruder methods. In children you cannot recognize the growths of the bones and their exact relationships, if they are altered by disease or trauma, but the X-ray findings are marvelous and correct. If there is a fissure fracture, the X-ray will always show the fissure; but the exact condition might not be made out just as readily by physical examination which gives pain to the patient, with the help of the X-ray a local cranial wound may be much better examined than in the usual way. If fracture exists, it can be readily seen with the fluoroscope in five to ten seconds, or a skiagraph may be taken, without any aggravation of pain or any danger of complication to the patient. In impacted fractures the diagnosis is almost impossible in any other way without great danger. The X-ray may also point out when reduction and coaptation can be effected or when an operation should be done.

With the help of the X-ray we will make correct diagnosis through the preliminary dressing, take the same off when the diagnosis is made and reduce the dislocation, apply proper dressing and observe constantly during the whole procedure our work until complete. In a case of fracture, we put the fragment together and apply the splints, and through them carefully observe the results of our work; may change the position of the fragments, if necessary, and apply our final dressing when the fragments are fixed. The dressing need not be changed until necessary, and we may further observe through the dressing the growth of the callus, how the union of the bones is taking place or not, or photograph through a plaster of Paris overcase, after an attempt at reduction, and see if proper approximation of fragments has been accomplished, and find sometimes, perhaps, that the union did not and could not take place. This, under no circumstances, could be made out by other means of diagnosis. Or, if we have a case of suspected fracture or dislocation, or both, where the swelling will not allow any digital examination on account of the pain or the inflammation which masks the true condition, the simple application of the X-ray at once reveals the state of affairs, without any discomfort to the patient and great satisfaction to the surgeon.

"It has been the observation of every railroad surgeon that it is quite impossible sometimes to form a correct estimate of destruction suffered by the tissues and bone, especially in a railroad crush, when the patient is laboring under a great shock or pain." But with the help of the X-ray we may see every particle of the crushed bone through the preliminary dressing and determine if amputation is necessary. Skiagraphs in such cases, taken soon as possible after the accident, and again after first dressing, and again when the patient is discharged from the care of the surgeon, leave the record complete. A skiagraph of a stump may sometimes be also very interesting and useful.

Such a method of correct diagnosis and the whole procedure in each individual case would be the only just solution of contention between employer and employed. And all this is done without general anesthesia. How often is the operation really of secondary importance as compared with the dangers of anesthesia in such and similar cases? With the facts before each party to the case, clear and unmistakable to both, is it not reasonable to think that litigation would diminish and enmity vanish?

The value of the X-ray in fractures and dislocations, together with all the necessary accessories, cannot be disputed any more. If you wish, the negative will give you the internal structures of the bones with a wonderful depth and perspective, and you will have the picture of the substance, not only the shadow, of which so many surgeons are still afraid. In such cases I use the tungstate of calcium screen over the photographic plate, and get shadows which are both shadow and substance, which, if we do understand them and intelligently interpret them, will always bring us to correct diagnosis.—Oklahoma Medical Journal, December, 1901.

OPERATING UNDER THE X-RAYS.

By J. F. Baldwin, A. M., M. D.

We present the following interesting case as reported by Dr. Baldwin in the Journal of American Medical Association, believing that it will be of use to our readers. The doctor says:

The removal of foreign bodies which have been accurately located by the fluoroscope or skiagraph has come to constitute every-day operations in surgical work. I have not, however, as yet seen any report of a case in which the surgical work itself was done under the light furnished by the X-ray and with the aid of the fluoroscope. Having had one such experience I deem it worthy of presentation to the profession.

George E. R., aged 9 years, was shot July 4, 1899. The bullet was a flobert and entered just above the right patella. The injury seemed to be slight and the wound healed by first intention. Some three weeks later, the joint beginning to give him trouble, an examination was made by his physician, Dr. S. M. Sherman of this city, who thought he detected the bullet under the skin at one side of the patella. He cut down upon the supposed bullet, but found nothing. I saw the case for the first time on July 25, at the office of Dr. Early, an expert radiographer. With the fluoroscope the bullet could be seen with very great distinctness, as the boy lay on his back, on a line with the upper border of the patella and apparently resting on the upper portion of the articular surface of the inner condyle of the femur. It could be seen very distinctly and its removal was apparently a matter of great ease. A skiagraph was made, which verified the view afforded by the fluoroscope.

The bullet, which seemed to be superficial, was located on the opposite side of the patella from that which had been operated on by Dr. Sherman a few days before. The operation wound was suppurating freely. Under an anesthetic administered by Dr. Sherman, an operation was made for the removal of the bullet July 19. A small incision was first made and enlarged as necessary, but notwithstanding a most thorough search, no bullet could be found.

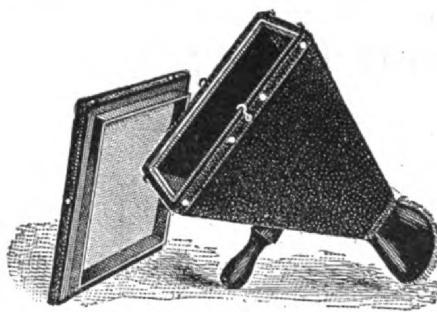
The only explanation that could be offered of the failure to find the bullet was that it was free in the joint and had simply changed its location during the intervening period. The patient was therefore returned to Dr. Early's office and the fluoroscope again used July 30. This showed the bullet at the back of the joint, but movable; its position could be shifted by rolling the boy upon abdomen. Since it was plain that the position of the bullet varied with changes in the position of the limb, it was evident that unless we wished to open the joint widely the operation must be made with the use of the fluoroscope. Accordingly the preparations were completed the following day.

The bullet was located at the bottom of the joint, the patient lying upon his back. When he was rolled on to the abdomen the bullet dropped down a little, but could not be brought to the dependent portion of the joint. The joint was, therefore, opened through a small lateral incision, and a pair of delicate forceps introduced, hoping to catch the bullet. The operation consisted in an attempt to catch a shadow with a shadow. In order to determine the position of the bullet and also of the point of the forceps, it was necessary to locate them in two planes, and this could only be done by rolling the patient back and forth from back to side, so as to get two views. With great difficulty the bullet was finally grasped, when it was found to be impossible to withdraw the forceps with the bullet in its grasp owing to the approximation of the articular surfaces. The bullet was therefore pushed up to the opposite side of the joint and extracted through a minute counter opening.

All things considered, I never performed a more difficult operation. The room was necessarily dark, the day was hot, and the noise of the machine was almost intolerable, while the fear of infection from the suppurating wound, which was in close proximity to my own incisions, was constantly before me.

Fortunately, although there was some inflammatory exudate present in the joint at the time of operating, there was no infection from the outside. The incision was closed carefully without drainage, a splint applied to secure fixation, and recovery was entirely uneventful, the ultimate motion of the joint being perfect.

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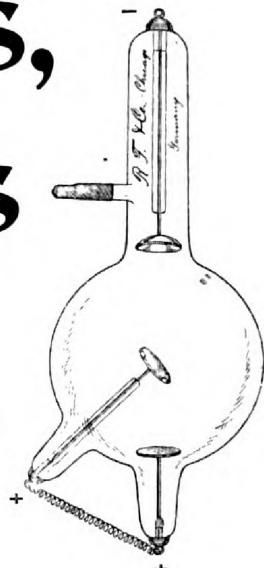
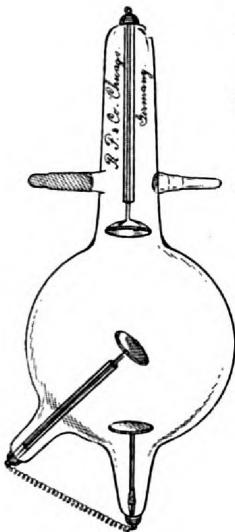
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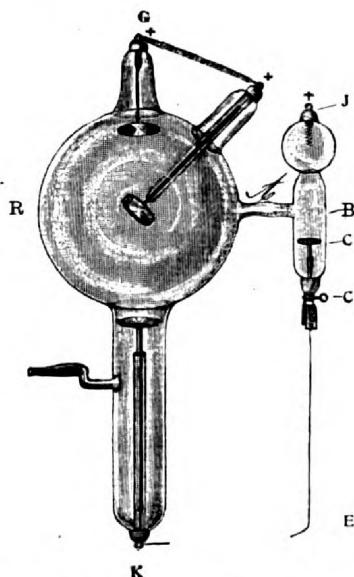
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NOTICE.

The January meeting of the Chicago Electro-Medical Society will be held at room 1302 Champlain building, corner State and Madison streets, Tuesday evening, January 28, at 8 o'clock p. m.

ELECTRO-THERAPEUTICS.

At no time has any practice of medicinal art been so alive to the scientific world as it is at present, for every day some new discovery of science in relation to living organism forces itself upon the attention of the physician, who is ever alert to know what he can of the human body, both in its abnormal and its normal states, so that he may successfully combat disease. In this new era of investigation the microscope has had its just place of honor, revealing as it does the hitherto invisible workings of the human system; and the chemist has busied himself with toxicants and anti-toxicants that may, rightly used, control the action

of "the mighty hordes innumerable" that have in the body of us their home and their activities. But what school of the past could undertake to tell what was the real force or energy of life action? True, electro-therapeutics is not a newly born child of the therapeutic family, but still we know that even now the medical world of the older schools of thought is loath to give it a fraternal recognition, treating it as a bastard among sons, that may be at times useful, but never to be called "one of the family"; and as such entitled to all the honors and emoluments thereof. But to-day this child of fortune, hitherto despised, seems to be coming into its estate, and not only that, it is beginning to assert dominion. On the last day of 1901 Dr. Loeb of Chicago University asserts that electricity is the vital power of all cell life, and the natural inference from such deduction must be that electro-therapeutics is the true theory of study for the physician, relegating the older theories to the place of servants that the rightful king might reign.

Professor Loeb's paper was on the subject "Physical Effects of Electrical Charge of Ions and the Electrical Character of Life Phenomenon." Professor Loeb says in his paper:

"Parthenogenesis has been interesting to me only to learn how the electric charges of ions affect life phenomena. The energy of foodstuffs and the motions of the heart are not, after all, due to the production of heat, but to the chemical energy in electrically charged molecules. A part of the chemical energy of foodstuffs is changed into electric energy which moves the body. Rhythmic contraction of muscles comes only in the presence of electrically charged substances. The efficiency of the action depends upon the number of charges of different ions. Pure salt is always poison because either the positive or negative substances predominate. Electricity neutralizes this effect of the salt solution. A muscle is stimulated by electro-negative charged particles, while electro-positive charged particles have an opposite effect."

In his study slowly but surely the professor has been drawing nearer and nearer to a clear insight into the vital processes of living organisms. He says:

"The human organism is made up of ions or electrically charged atoms, or groups of atoms, in solution. If it were possible to introduce in the body these electrically charged molecules we should be able to modify the qualities of the tissues. The body becomes overcharged with ions, which are toxic, or poisonous, in their effect. Now, by introducing ions of an opposite character we should be able to overcome the bad effect of the former."

Following Dr. Loeb, and corroborating him, Professor Mathews sought to show that what he had said of the tissues held good for nerve cells. Professor Mathew's word may be summed up as follows:

I. Motor nerves contain or consist of a colloidal

solution, of which the colloidal particles carry positive electrical charges.

2. Nerves are stimulated by the passage of the colloidal particles from a condition of a solution to that of gelation.

3. This change is brought about by the action of electrically charged atoms which bear negative charges. The stimulating action of any compound depends on these negative charges.

When the negative charges are set free by the colloidal particles being forced together they precipitate the next layer of colloids, which in turn set free negative charges. This precipitates the next layer and in this way the nerve impulse is carried.

If these things are so, and we believe they are, then those words of Dr. Neiswanger before the Chicago Electro-Medical Society at a late meeting, that "there is no disease of the human system but that can be made to yield by the proper use of electricity," are words of true wisdom, not of fanaticism or of ill-timed enthusiasm. If it is true, as we have long contended, that we owe to electricity, to electric action, all that there is of form in the visible universe, then it must follow that by electric methods must be mended all the disease of formation. True, we may by compounds, medicines, excite these needed repolarizations of the various parts of the body, but how much better if we can, by direct application of the electric energies, do the work?

Creation and recreation—are they not parts in the method of the universal whole? And the nearer we get to nature the more successful will be our work as physicians.

In regard to artificial reproduction, a subject with which Dr. Loeb has experimented for a long time with the most satisfactory results, he said that all his experiments had been conducted in order to discover whether electrically charged atoms worked in the same way in regard to division of cells, rhythm of muscular contraction and nerve impulses, and he found that they did; and this but substantiates our position, for the power that creates is surely the power to regulate! "The time is coming, and now is," when electro-therapeutics in the various forms of galvanic, static and X-ray work will be the commanding pathology of the world.

In the discussion of the paper by Professor Loeb scientists present were warm in their congratulations to him and his associates in the work done. Professor G. N. Stewart of Western Reserve University said:

"This is a look into the mechanics of living tissue which we have never had before. Dr. Loeb has brought to the front the subject of electro-physiology heretofore despised."

"This work opens a new heaven and a new earth in physiology," declared Professor Mathews of the

University of Chicago. Dr. Martin Fischer, another scientist, said:

"This practically changes the entire basis of physiological text-books, which will have to be in great measure rewritten."

We note with pleasure that this conclusion of Professor Loeb, though arrived at upon entirely different lines of study, corresponds with the views of Dr. H. P. Pratt, as published by him some five years ago; not that we consider that the matter is fully settled, but these varied experiments by the scientists of worldwide prominence all seem to be pointing in one direction, and almost compel us to recognize as a fact that electro-therapeutics has the lead in real scientific work among the many schools of therapeutic practice.

MEDICAL JOURNALS.

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CAREFUL SCIENTIFIC OPERATORS NECESSARY IN THE USE OF THE X-RAYS.

In the Critique for October we find some very pertinent suggestions upon this subject from the pen of James W. Ward, which we present to our readers as worthy of consideration. He says:

The reliable diagnosis or exclusion of renal and ureteral calculi furnished by the improvement in X-ray technique, and the complete operation with the kidney under control, has placed nephrolithotomy in a position where it rivals in accuracy of diagnosis and safety of procedure the old lateral lithotomy the brilliant operation of our student days, the mortality in each being about 3 per cent in the hands of the expert.

Skiagraphy of biliary calculi in the hands of Dr. Carl Beck has been productive of definite results. The patient should be in the abdominal position, the pencil or X-rays sent obliquely so as to invade the smallest amount of tissue. The field has been carefully covered by Prof. J. W. White, as to the medico-legal relations of the Roentgen rays. I quote:

"1. The routine employment of the X-ray in cases of fracture is not at present of sufficient definite advantage to justify the teaching that it should be used in every case. If the surgeon is in doubt as to his diagnosis, he should make use of this, as of every other available means, to add to his knowledge of the case, but even then he should not forget the grave possibilities of misinterpretation. There is evidence that in competent hands plates may be made that will fail to reveal the presence of existing fractures, or will appear to show a fracture that does not exist.

"2. In the region of the base of the skull, the spine, the pelvis and the hips, the X-ray results have not been as yet thoroughly satisfactory, although the skiagraphs have been made of lesions in the last three

localities. On account of the rarity of such skiagraphs of these parts, special precaution should be observed, when they are affected, in basing upon X-ray testimony any important diagnosis or line of treatment.

"3. As to the question of deformity, skiagraphs alone, without expert surgical interpretation, are generally useless and frequently misleading. The appearance of deformity may be produced in any normal bone, and existing deformity may be grossly exaggerated.

"4. It is not possible to distinguish after recent fractures between cases in which perfectly satisfactory callus has formed and cases which will go on to non-union. Neither can fibrous union be distinguished from union by callus in which the lime salts have not yet been deposited. There is abundant evidence to show that the use of the X-ray in these cases should be regarded as merely an auxiliary to other surgical methods, and that its testimony is especially fallible.

"5. The evidence as to X-ray burns seems to show that in the majority of cases they are easily and certainly preventable. The essential cause is still a matter of dispute. It seems not unlikely, when the strange susceptibilities due to idiosyncrasy are remembered, that, in a small number of cases, it may make a given individual especially liable to this form of injury.

"6. In the recognition of foreign bodies the skiagraph is of the very greatest value; in their localization it has occasionally failed. The mistakes recorded in the former case should have been easily avoided; in the latter they are becoming less and less frequent, and by the employment of accurate mathematical methods can, probably, in time be eliminated. In the meantime, however, the surgeon who bases an important operation on the localization of a foreign body buried in the tissues, should remember the possibility of error that still exists.

"7. It has not seemed worth while to attempt a review of the situation from the strictly legal standpoint. It would vary in different states, and with different judges to interpret the law. The evidence shows, however, that in many cases, and under many differing circumstances, the skiagraph will undoubtedly be a factor in medico-legal cases.

"8. The technicalities of its production, the manipulations of the apparatus, etc., are already in the hands of the specialists, and with that subject, also, it has not seemed worth while to deal. But it is earnestly recommended that the surgeon should so familiarize himself with the appearance of the skiagraphs, with their distortions, with the relative values of their shadows and outlines, as to be himself the judge of their teachings and not depend upon the interpretations of others who may lack the wide experience with surgical injury and disease necessary for the correct reading of these pictures."

Conclusion.

I am impressed that the future triumphs of surgery will depend greatly upon improved technique, profounder studies in pathology, and especially upon the nearer scientific association of the physician who sees, diagnoses, prescribes, decides and the surgeon who is the final arbiter and the possessor of the special skill required.

We cannot divorce medicine from surgery without impairing the clinical result of the latter. Let every student in our medical colleges study anatomy and *materia medica* every day of every year throughout his college life, then there will be eliminated that great danger of modern surgery which is becoming more apparent every day, the tendency to operate hastily, and even unnecessarily, owing to the ease with which operations may now be safely performed. The growing custom of associating the physician and surgeon in the treatment of many cases in which operative intervention may be required is, therefore, a step in the right direction and brightens the dawn of the glad day to larger and greater success.—James W. Ward, M. D., in Pacific Coast Journal of Homeopathy.

SKIAGRAPHY IN ORTHOPEDIES.

At the October meeting of the New York Academy of Medicine Dr. Weigel read a paper upon the above subject that we here present to our readers, illustrating his discourse with many negatives adjusted in the X-ray stereoscope which he used. A brief reference was made to the technique of stereoscopic skiagraphy, and the advantages over the ordinary method of producing X-ray negatives were fully explained. The technique was not difficult. He considered one of the principal difficulties in skiagraphy—the proper interpretation of the negative in the stereoscope. The idea of depth was given which was not apparent when viewing the negative alone. By reversing the negatives in the apparatus the pictures could be viewed from the opposite surface.—Medical Times and Register.

X-RAY IN CASES OF SUPPOSED FRACTURE.

A. L. Mader, M. D., has in "Maritime Medical News" a well-written and exhaustive article upon treatment of fractures, and in it uses these words: "I hope the Roentgen rays in these later days, by diagnosing obscure longitudinal fractures, which are generally treated as sprains, will not cause disability to the same extent as under other or common methods of diagnosis," thus adding his testimony to the long list of eminent physicians and surgeons, to the value of the X-rays in all that pertains to this comparatively new method.

In this connection we would say that the Maritime Medical News of Halifax, N. S., is a welcome visitor to our table, and is well filled with able matter.

SECRETARY'S REPORT.

The December meeting of the Chicago Electro-Medical Society was held on Monday evening, December 30, at room 1302 Champlain building, corner of State and Madison streets, Chicago.

Meeting called to order at 8:15 p. m., President Burdick in the chair. Owing to the temporary absence of the secretary, the reading of the minutes was postponed. On motion, the constitution was amended, giving associate members all the privileges of the society, except that of holding elective offices.

The society then proceeded to the reading of the papers of the evening and their discussion. The first in order, by Dr. H. P. Pratt, entitled "Some criticisms of a paper by Dr. Pusey as published in the American X-Ray Journal." Paper discussed by Dr. Burdick, Messrs. Friedlander, Treadwell and Scheidel. The next paper was by Dr. T. P. Hall, entitled "Some X-Ray Freaks," and was discussed by Drs. Pratt, Burdick and Prof. Treadwell.

Dr. H. P. Pratt proposed W. A. Pratt, M. D., as a member of this society. Name was referred to membership committee.

The secretary being present, the minutes of the last meeting were read and approved. Dr. H. P. Pratt presented the case of a physician where a jury gave damages in favor of the plaintiff patient, basing their verdict upon a radiograph taken by a non-professional operator. The matter was referred to a committee consisting of Messrs. Friedlander, Treadwell and Hall. The following committees were appointed by the chair: Membership—Drs. A. H. Baer, C. S. Neiswanger, W. R. Burch. Auditing—A. B. Slater, R. S. Gregg, J. O. M. Hewitt. Publication—R. Friedlander, Drs. S. V. Clevenger and R. H. Street. Scientific Research—Drs. H. P. Pratt, T. P. Hall, Prof. C. H. Treadwell. Executive—R. Friedlander, Drs. J. E. Gilman, H. P. Pratt. On motion, "Publicity" was named the subject for discussion at the next meeting. Visitor present: Ethel Heard, M. D., of Minneapolis. Meeting adjourned. Time, five minutes after 10 o'clock, Monday evening, December 30, 1901.

RICHARD H. STREET, Sec.

WHAT IS THE ACTION OF A COIL INSERTED IN THE CIRCUIT OF A GALVANIC BATTERY?

Dr. W. R. D. Blackwood says (Nov. No. Medical Summary): "I have been asked what is the action of a coil inserted in the circuit of a galvanic battery?

"My answer is: The action is to introduce 'resistance,' which destroys the value of the current in proportion to the length of the wire forming the coil. By Ohm's law we find that the amperage is reduced by resistance, and consequently we lose just so much galvanic action. Ohm's law is, The quantity of electricity passing through a given point in a circuit varies directly as the electro-motive force, and inversely as the resistance.

"Second, 'What is the use of a faradic coil introduced in a galvanic circuit?'

"My answer is: It is a question of personal taste. Long ago electro-therapeutists who have much experience learned that combined galvanic and faradic currents were of little value at any time, and contradictory generally. The so-called 'high-tension' coil is a misnomer, for tension was some years ago meant what we now term 'voltage,' and pressure is not increased by coil winding. The long wound coils simply add great resistance to the passage of the current; hence the pretended soothing effect, which is simply due to very little electricity passing through the patient. A strong current irritates; a weak one does not.

"Voltage is increased by adding cells to the primary circuit—each cell having about one to one and a quarter volts—the amperage is not increased by this addition. A cell as small as a thimble has the same amperage as one as big as a barrel, but the big one lasts longer before being worn out. Electropoion cells are dirty and have been discarded long ago by those who value time, cleanliness and good results. The addition of sulphate of magnesia or any other salt destroys the value of the chromic acid which is the factor in electropoion fluid. Polarization cannot be prevented; it comes from the hydrogen being deposited on the distributing electrodes. The battery soon recovers itself.

"Third, the action of a coil interpolated in a galvanic circuit is to produce condensation, just as the spark coil does in gas-lighting apparatus. We have several forms of condensers, the usual one in Rhumkorff's or Ritchie's being the 'plate,' which is a long layer of tinfoil placed between layers of oiled silk, and located beneath the coil itself in the base. The 'rolled' condenser is much the same in telephones for long distance, the form being circular to save space. The capacity of a condenser is usually about 2+ Microfarads.

"Faradic machines produce an interrupted alternating current, the alternations being, of course, equivalent to a circuit-breaker producing interruptions. The current is 'to and fro'; at the 'make' it is from left to right through the conductors from the secondary, and the reverse at the 'break.' In the 'break' we get the so-called 'extra current,' due to self-induction from the superimposed coil layers, and the spark at the rheotome is a direct loss of energy. Faradic machines may be so fixed as to give a direct flow, but this is of doubtful value in medicine. The price is prohibitory. Mine cost me two hundred and twenty-five dollars. A good machine for ordinary use by physicians can be had at fifteen to thirty dollars. My direct arrangement has double commutators which switch every second pulsation into individual circuits, and as the alternations are somewhat above forty thousand per minute each collector gets twenty thousand—far beyond the ability

of the muscles or nerves to recognize. I use either or both on the same patient, or sometimes on two different ones at the sitting.

"In electro-therapeutics we simply require galvanism, and interrupters, reversers and such attachments are seldom needed. My own switchboard is very complicated, and it has lots of electro-magnetic and manual contraptions, but they are for use in commercial work, such as testing and experimentation, which relieves me from visits at times to the power houses. As to faradism, we need simply a good coil, and the practice of combining the two currents is of doubtful utility, as said above. I seldom use the sinusoidal apparatus, and also do not do much with the static now, except in minor nervous troubles. Simplicity is the sine qua non in medicine; too much twaddle has been written about medical electricity. I have more than two hundred books on the subject, and all the cream of them can be put into fifty pages instead of the twenty thousand leaves of the volumes.

"I have treated three cases successfully of tetanus, which is somewhat akin to the spasms of hydrophobia, if there is such a disease, and I used galvanism alone, of course, for we then need sedation. Faradism would aggravate the trouble, as that current is a cerebro-spinal stimulant. Inverse currents sedate; direct act oppositely in galvanism. Controllers which act as 'sliders' are the only proper ones in medicine, all posts which jump from button to button produce more or less shock at each addition or subtraction. The graphite rheostat is a good example of a sliding controller. The entire battery is between the terminals, and the current is therefore regulated by the controller alone.

"My galvanic plant is of two hundred and fifty cells of Leclanche, in sections of a hundred each, with one of fifty. This cell runs at full load for ninety minutes with about 7 per cent in polarization, which is abrogated by additional cells as required, and the battery renews its strength in about twelve minutes to par. For heavy work I use the storage or secondaries. The accumulators are of the chloride type, and I keep them in circuit always with the improved callauds, thus having them at all times up to high energy.

"Electricity is a very big thing in medicine."

We quote the above not only that it deals with the question in an able manner, but because it is one more evidence that electro-therapeutics is obtaining constantly a firmer hold upon consideration of the profession, who in the past have not thought it to be much more than a means of attracting a patient's mind away from his "aches and pains," and so producing a psychic effect, rather than as a real curative as well as creating agent in the great universe of life. We know that it is the last view that is the correct one, and yet we do not deny that it may be at times the other; but eventually all must recognize it as "the one" powerful means of health.

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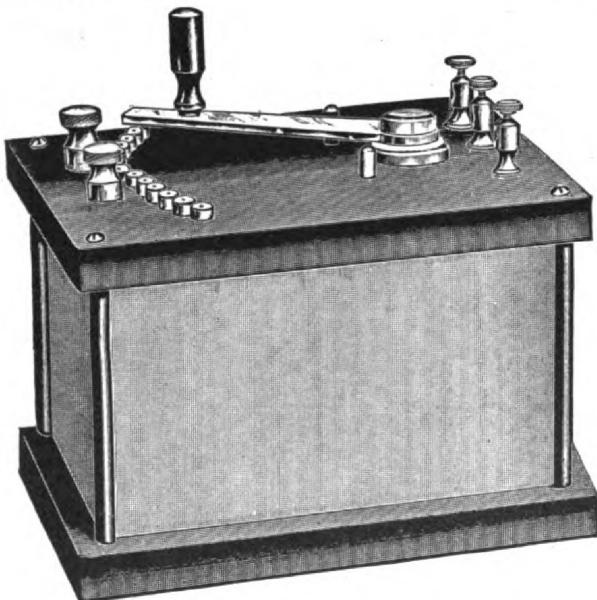
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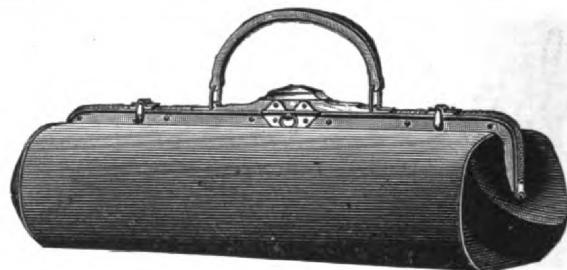
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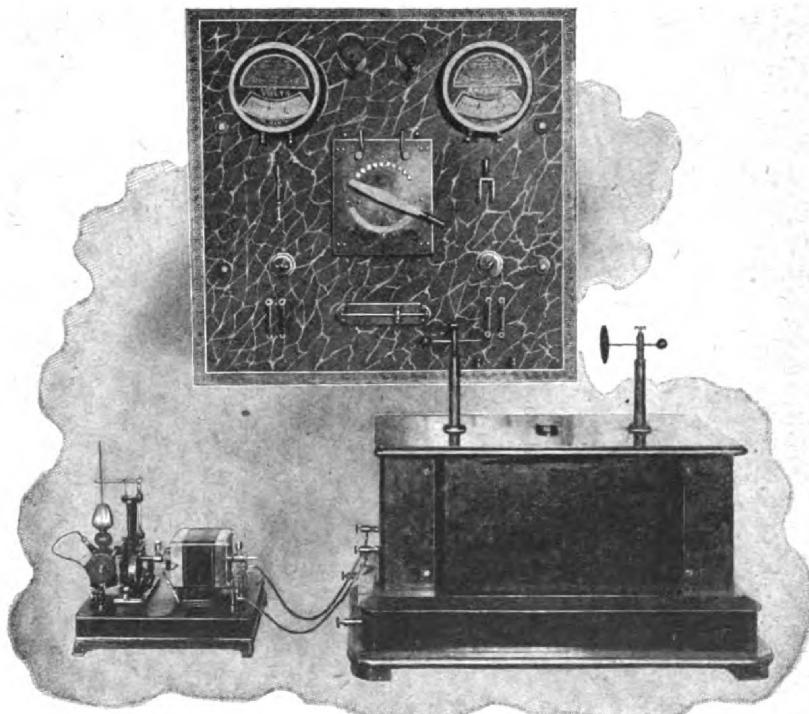
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AMERICAN Electro-Therapeutic and X-Ray Era

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VOL. II.

CHICAGO, MARCH, 1902.

No. 3.

CAN CONSUMPTION BE CURED BY MEANS OF THE X-RAY?

Paper read before the Chicago Electro-Medical Society Feb. 25, 1902, by

Gordon G. Burdick, M. D., President Chicago Electro-Medical Society, Prof. Radio-Therapy Illinois School of Electro-Therapeutics. Associate Prof. Surgery Post-Graduate Medical College. Surgeon People's Hospital.

In cases of simple tubercular infection among people with great recuperative powers there is no question in regard to the great value of the X-ray. It has been thoroughly demonstrated that the ray arrests the tubercular process, and if the body possesses sufficient vitality a prompt recovery occurs after its use without any other treatment. In people of low vitality, other means must be used in addition to the ray if a permanent result is to be obtained.

Abscesses of the lung must be carefully drained by means of compressed air, and the remaining lung tissue must be developed. The hard, dry cough left after the Ray treatment must be combated by means of nebulized oil with some mild sedative. Defective digestion needs continued attention. Constipation is sometimes produced by the Ray treatment, and must be looked after carefully.

Anemia, if profound, calls for the usual Feruginous tonics. If waste products are excessive, some good reconstructive substance, such as thicol, cod liver oil, albumen, etc., must be administered.

Physicians who have weak and inefficient apparatus and absolutely no knowledge concerning the physics of the X-ray vacuum should not expect to obtain favorable results in the treatment of the disease. We have no standard, excepting individual experience at the present time, to determine the proper working vacuum of a tube for medicinal use. Consequently, for some time, we must expect to have some discouraging reports from this source.

Physicians must not rely too much on the Ray as a cure, neglecting ordinary precaution in the treatment of this dreadful disease. If they will regard it only as a very useful agent, and give the patient intelligent medical care as the need of it may be indicated, they will be astonished at the favorable result they will obtain.

To obtain desired results, a powerful generator must be used and fine discrimination in regard to the safety limits of exposure, as the vacuum used is very close

to the point where tissue necrosis will take place. If the vacuum is sufficiently high, it accelerates the growth of the tubercular process and the progress of the disease is hastened; therefore, great care must be used that the vacuum is at the proper point.

A curious result noted in a few cases wherein the treatment was pushed farther than experience would warrant, was the severe "biliary attacks" produced. The tongues became furred and dry, bowels constipated, coughs hard and dry, eyes yellow, digestions erratic, temperatures elevated and there was severe aching of the bones. In two cases I could produce this condition at will by giving twenty minutes' treatment. Care must be taken to ascertain that a possible infection of the bowels does not exist. Three cases proved the need, as after six weeks' treatment the temperatures remained at the same point, although the lungs were beautifully clear. By lowering the tube six inches and allowing the light to pass through the bowels, the temperature became normal after six weeks.

An important question to determine is when a patient may be considered cured of tuberculosis. It is doubtful if a patient is ever cured, when once infected, to the complete disappearance of the tubercular bacilli from the body. I consider the patient as cured when he regains his normal standard of weight, strength, and ambition, even if he occasionally does raise a little sputum in the morning in which may be found a few tubercular bacilli. It is in this last sense that radiologists refer to apparent cures of tuberculosis by means of the Ray. It has been known for years that the tubercular processes would be arrested if it was possible by means of forced feeding and the administration of certain drugs or foods so to improve the nutrition that the body began to take on weight. The patients would apparently recover their normal condition of health.

The trouble heretofore has been the inability to stop the rapid growth of the tubercular process sufficiently long to enable the enfeebled constitution to recover its normal vitality. It is in just such cases that the Ray has its peculiar value, inasmuch as it seems to hold in check the tubercular process and in some unknown way to stimulate the enfeebled tissues to greater activity and allow the body to regain its normal condition. Take a patient who under the best medical treatment could not recover, and he will slowly recover under the Ray, while in incipient tuberculosis recovery is rapid and prompt.

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A radiograph of the lungs always should be taken and the focii of the disease should be located before beginning treatment. Care should be used until it is ascertained how the patient reacts. Carelessness in the beginning may put the patient in bed, suffering from a violent case of poisoning from the liberated waste products, as the absorption is extremely rapid if the treatment is unduly pushed.

I have treated thirty-three cases of tuberculosis and have had occasion to stop treatment in only two cases. In those two the patients reacted so violently to the use of the Ray that it was inadvisable to continue the treatment. Both of the patients still are alive, although they discontinued treatment six months ago. They both are suffering from chronic tuberculosis, but are no longer bed-ridden, and are able to get around without much difficulty. They cannot be considered cured, but are much better than they were before treatment.

Mixed infection does not react so favorable to the Ray treatment. With four patients of this kind of tuberculosis I failed to get the proper results until I had injected them several times with antistreptococcin serum, when the cases ran the usual course and the patients eventually recovered. I have had six cases of joint tuberculosis in five years and have had the satisfaction of seeing five of the patients recover.

The apparatus used was a 12-inch coil with an interrupter giving about 2,700 interruptions a minute. A primary current was used, of 6 amperes, at 110 volts pressure. I have used various tubes, but prefer the Volthom or Queen tubes, as it is possible to keep them low enough in vacuum to give off the proper wave length for radio-therapeutic treatment. Exposures have varied from 10 to 15 minutes. Usually 15 is about right. Treatment was given through the clothing, as it was found that the liability to burns was diminished.

Three curious conditions have arisen in regard to the value of the Ray. Any physician agrees that its usefulness is thoroughly demonstrated in surface disease. But many deny the possibility of its usefulness in deeper structures, wholly ignoring the fact that the intense chemical light passes through the body and is just as active after its passage as before, which activity may be demonstrated by its manifestations on fluorescent salts and its reduction of bromide of silver, as well as by the profound effect on excretions and temperature. This skepticism is due to the fact that radiologists have confined their experimental work to surface disease in order better to study the effects of the treatment. The ever-present fear of getting an undesirable burn makes the course of their experimenting lively and unprofitable. But as their knowledge and technique has improved, some boldly invaded the body and have been astonished at the results they have obtained in what has been regarded as incurable diseases.

The results, on the whole, have been brilliant. But

we are all reluctant to publish them until some satisfactory way is discovered of measuring the strength of the light used, as well as to develop a perfect working technique that others may follow, in order that the host of experimenters in this field may be led along the right lines instead of meeting a succession of failures which are sure to follow if they attempt this work without proper preparation.

Physicians with static machines should expect to be disappointed if they attempt the treatment of the deeper structures with the X-ray. So little current is generated by even the best of the machines that in order to pass the light through the body too high a vacuum is necessary. I spent nearly a year experimenting with them and found that even with a large 24-plate machine the best I could do was to get a therapeutic effect in lupus. There is no reason why a static machine may not be increased in efficiency by adding more plates, excepting the weight and consequent cost.

A wave length that causes the best fluorescence is very objectionable from a therapeutic standpoint. Its physiological action seems to stimulate disease rather than retard. Consequently we have to fall back on the coil, which possesses sufficient energy to force the Ray through the body at a wave length barely visible on a screen, yet possessing the most intense chemical efficiency. It is this Ray that radiologists are using in the treatment of disease, a Ray that is unknown to the average owner of an "outfit." Consequently we dread the invasion of the field at this early day by an army of so-called "specialists," who have money, instruments, and considerable business ability, but no knowledge of electricity or the physics of the X-ray.

Misfortune is sure to follow the general introduction of the Ray in the treatment of disease. I know personally of the sale of instruments to at least thirty mechanics, electricians, and advertising specialists. These people are treating to-day some of the greatest diseases known to the medical profession. There is no way to stop their business, as the law is evaded by putting a photographic plate behind the patient from day to day while the exposure is given, ostensibly for the purpose of taking a radiograph. In reality the diseased area is only treated.

There is one encouraging sign, however, in the numerous damage suits brought against members of the medical profession, based on radiographs taken by irresponsible people outside the profession. Personally I hope the good work will go on until physicians realize that their interests are best conserved by physicians who are bound by the iron code of ethics, and not by the "almighty dollar."

The first published report of a treatment by means of the X-ray was by Dr. H. P. Pratt of Chicago, Chicago Medical Times, July, 1896, reported by Finley Ellingwood, and earlier in the year by the daily papers. The

sensational manner in which it was brought out during the infancy of the Ray caused it to be viewed with considerable skepticism. Investigations that I have conducted lately confirmed his results. He had some tubes, constructed by a local glass-blower, that were worthless for radiographic purposes, but were ideal for radiotherapeutic purposes. The tubes are in existence today. While he did get remarkable results in the treatment of the disease, he was unable to make a satisfactory radiograph until recently, because of his wrong conception of a proper working vacuum.

Hahn reports that a patient suffering from chronic pulmonary tuberculosis was exposed by Rieder to the X-ray, but with no encouraging results. Dalinger states that Begonie and Mongour report two cases of acute phthisis in individuals who were in bad condition, owing to poor nourishment and excessive use of alcohol. The results were negative. But in lingering pulmonary tuberculosis slight positive results were noted. In another case there was rapid improvement in the general condition, and the strength and appetite increased, but the local process remained unchanged.

A third patient improved locally and generally during the first month of treatment and then severe digestive disturbances appeared. Dr. Sinapos, in August, 1897, published a pamphlet in which he gives an account of his use of the X-ray in the treatment of tuberculosis. He cites a number of cases in which he obtained excellent results, but the careless way he wrote his paper leaves much to be desired.

Southgate Leigh gives a report of a case of tuberculosis in the elbow joint, which is reported by Werner. The elbow was exposed to the Ray for two hours from two to three times a week, and after twelve hours' exposure the inflammation had disappeared and the patient was free from recurrence for eighteen months when reported upon.

Dalinger states that Kirmisson reports a case of tuberculosis of the wrist joint which had improved by daily sittings of ten minutes' duration for two and a half months in which the patient was cured completely by elastic compression following the X-ray treatment.

Dr. Ivar. Bagge of Goteborg, Sweden, reports a case of tuberculosis following a severe burn of the chest and back by scalding water. The case has existed for seventeen years and finally became so bad that the patient was sent to a hospital. He contracted a cold and succeeded in inoculating his nose while sick, and was turned over to Dr. Bagge, in January, 1900, for X-ray treatment, with the result that the wounds on both front and back were healed in three weeks. Dr. Bagge states that the striking point in this case was the fact that the patient was only treated on the front of the chest, but that he cured the larger ulceration on the back as well as those under the axilla as quickly as those below the clavicle.

I reported in the "American Electro-Therapeutic and X-ray Era," during July, 1901, thirteen cases of pulmonary tuberculosis and five cases of joint tuberculosis in which, at least, six months of time has elapsed since the treatment was discontinued. I can report sixteen cases in addition that have been treated since the report was made.

In every one of these cases a microscopical examination was made to determine the diagnosis, and a radiograph was taken of the lungs. There can be no question as to the value of this agent in the treatment of tuberculosis. The erratic results obtained in the reported cases can only be explained by a lack of knowledge concerning the use of the Ray. When the experimenter happened to use the proper tube—that is, one useless for other purposes, a prompt and surprising result occurred. When he used a tube that gave off good X-rays, that is a fine tube viewed on the fluorescent screen, no results were obtained, which only confirms my previously expressed opinion that many failures are sure to be reported just as soon as the treatment comes into general use.

The average "X-ray expert" would consign a tube to the junk pile just at a time when it becomes most useful and when it is really worth its weight in gold in the treatment of disease. Therefore, success cannot be expected from his hands.

I have to thank Dr. J. J. Morgan, who has extended the courtesy of his bacteriological laboratory to me, and who has kindly made a number of examinations for me. The only other physicians I am under obligations to are Drs. Chas. Simon and Rockwell, who have sent me a few cases.

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Discussion.

Dr. Gilman heartily commended the paper both for its convincing report of work done and for its sound views regarding the effect of the treatment on the system of the patient. From his studies in sanitary science he had come to look upon the growth of bacteria as due to a scrofulous condition caused by a sluggish action of the lymphatics. A region of land poorly drained is not unlike this scrofulous condition of the body. It becomes a favorable soil for the growth of bacteria.

Early in 1896 he was much interested in work done by Dr. Pratt in testing the effect of the X-rays on different pathogenic bacteria. He was soon led to advocate the use of the X-ray on the diseases now extensively treated by this agent.

Dr. Hall said he had been looking up the literature of the subject and was much interested to see the opposing views regarding the efficacy of X-ray treatment in tuberculosis. The reports were not generally definite enough for one to judge concerning the quality of the X-ray used, but he now had no doubt that more consistent results would have been obtained if a medium low tube had in all cases been used. There was likewise disagreement as to the bactericidal power of the X-ray, due probably to the use of tubes having different vacuums. The statements in the paper on this point are very important.

Dr. Grubbe held that the static machine might also be used to excite the X-ray tube. He used both the static machine and the coil, treating some patients exclusively with tubes excited by the former. He admitted that the same tube would give a more powerful X-ray from a coil than from a static machine, and so when using the latter he gave longer treatments, in some cases four or five times as long as for coil treatment.

Regarding experiments on the bactericidal power of the X-ray, he said that even when the bacteria had been destroyed in culture tubes, it might well be due to the ozone generated at the terminals of the coil. Special care ought to be taken to prevent this free ozone in the air from reaching the cultures within the test tube. On the other hand, the X-ray should not be sent through the walls of a test tube because glass is quite opaque to the non-penetrative X-rays.

Dr. Pratt was much pleased with the paper. He felt that negative results in later experiments did not impeach his early work on the germicidal power of the X-ray. This work was done under the auspices of the Bennet Medical College. Dr. Wightman furnished the cultures. A number of species of bacteria were killed. It required long exposure with low tubes. At first the bacteria seemed to thrive, but after a few more exposures they were killed. He held that the X-ray would lose little of its power in passing through the glass test tube and the stopper of absorbent cotton would not allow free passage to the ozone. He stated that though Dr. R. Zeit reported no effect of the X-ray on cultures of bacteria, most experimenters admit that the X-ray is antiseptic. This ought to mean that the X-ray destroys bacteria.

Dr. Pratt held that the tubercular bacilli are of the same chemical elements as the lung tissue. Both the bacteria and the body have a certain amount of vital force. The X-ray being a high potential electric current, produces decomposition or dissociation of the weaker of the two structures. It is therefore important to use the needed tonics to strengthen the vital force of the patient. The tubercular bacilli are then decomposed.

Dr. Clemensen stated that he assisted Dr. Zeit in the experiments mentioned above. They exposed tubercular sputa and afterwards inoculated guinea pigs. He stated that in no cases were they able to destroy the bacteria in the sputa.

Dr. Burdick spoke more in detail on Dr. Zeit's work in which he assisted. They experimented on several different species of bacteria, some of them being non-pathogenic. Their results were not altogether satisfactory. The chromogenic properties of some species were affected, but none destroyed. The tuberculous sputa was placed in petra dishes over which was glued paper

both to insure isolation from bacteria in the air and to prevent germicidal action of the free ozone. Some sputa was exposed as long as two hours. As a control experiment several guinea pigs were inoculated from the sputa before its exposure to the X-ray. Another set was inoculated after the exposure. Both sets of pigs invariably developed tuberculosis; those inoculated from the sputa before X-ray treatment, had the disease in three to four weeks, the rest in three to four months or longer. This seems to suggest that while the X-ray did not destroy the bacilli, it lessened their virulence.

C. H. Treadwell, B. S.

THE THERAPEUTICS OF THE X-RAY.

By John A. Lee, M. D., Associate Surgeon St. Mary's Hospital.

Read before the Medical Society of the County of Kings.

Scarcely five years have elapsed since Roentgen first gave to the scientific world the first practical demonstration of the availability of the excitation of Crooke's tubes.

Medical science, always alert for the fulfilment of its mission, quickly appropriated to its own use the practical side of this epoch-making discovery.

Of the wonders of medical and surgical pathology suddenly disclosed to our view it is unnecessary for me to speak. The well-recognized place which Roentgenism has gained in diagnosis cannot be lost. But I am not here to defend the diagnostic advantages of the rays. I would rather present for your discussion this evening another phase of the discovery of Professor Roentgen, and one until lately unsuspected; the value and extent of which at present is in a somewhat undecided state. I refer to the therapeutic uses of the X-rays in skin diseases and closely allied conditions.

While the study of the physical side of the X-rays presents many problems worthy of exacting thought, and while the manner in which the rays act may be explained only when those problems are solved, yet as practitioners we are concerned only with results.

No doubt in many instances extravagant and baseless claims have been made in X-ray therapeutics, notably as to the results in tuberculosis and neuralgia, yet I believe we have by no means reached our limit, and I feel certain the future will broaden the scope of this work.

In looking over the results attained in the past two years, I have selected certain cases as types of conditions, the successful treatment of which may pretty safely be expected.

But before we proceed there are certain misconceptions which must be corrected and some points made clear. First, the X-rays are not bactericidal; in fact, they rather stimulate bacterial growth, and herein they

differ from the action of sunlight, violet light, or Finsen's light. Second, the exposures are neither long nor numerous. Third, with this treatment there is no operation, no anesthetic, no pain, and the scars are superior to anything hitherto done. Fourth, the results have been obtained in a class of cases the treatment of which has baffled medical and surgical minds for generations, or in cases the surgical treatment of which results in mutilation. Fifth, it is unnecessary to set up any dermatitis.

Having stated these points, and they can all be demonstrated, we will consider some cases. We naturally turn to lupus as the disease most successfully combated. The reports of the successful treatment of lupus by the X-rays have occupied a prominent place in our journals for the past year. Whether lupus can be totally eradicated or only kept quiescent is an interesting question. I believe from my own experience, and from cases I have studied, that we do not completely destroy the disease, but the results of the treatment are such that we always affect a practical cure. My point is well illustrated by the report of a case treated by C. Thurston Holland, M. R. C. S., and reported in the Archives of Roentgen Ray, London, May, 1901. In 1899 he had reported a case of lupus of the face treated and cured for the time being by the X-rays. The case remained quite well for a period of two years, when there was a distinct evidence of the return of the disease. Between May 9th and 21st, 1900, the diseased area exposed again six times, the lupus was again cured; the whole scar has remained in a healthy condition up to date. This result, I think, we can expect in our most obstinate cases. Does any other treatment offer more? Does any other treatment offer as much?

Mr. Startin reports before the Roentgen Society of London a rodent ulcer cured in twenty-five applications, and Dr. Low finds rodent ulcer much more amenable to the X-rays than lupus, and in the Philadelphia Medical Journal for December 8, 1900, Johnson and Merrill report six cases of slowly growing epithelioma treated by the X-rays. All were benefited and several were cured, the ulcerated surface being replaced by a soft, painless scar.

In two cases of hypertrichosis, Jutassy reports good results. Haben and Albers say we can expect 30 per cent cures in all cases of skin disease. And Schiff and Freund report favorably in cases of syphilis and favus. The rays have been disappointing in the treatment of psoriasis. The ulcerations of inoperable carcinomata can be much benefited, pain and discharge rapidly ceasing under treatment. Brilliant work has been done upon naevus. Jutassy reports an especially interesting case. The patient, a man 22 years of age, had a port-wine stain which covered the whole of the right side of his face and involved the mucous membrane of the mouth and nose as well. The treatment was continued

at frequent intervals until a dermatitis was established that detached the epidermis completely from the nævus. It took this two months to heal, and at the end of that time the nævus was gone. A year and a half later it was noticed that the greater portion of the skin was perfectly normal.

This résumé of the therapeutic applications of the X-rays I desire to present for your discussion and consideration. Cognizant of its limitations, I cannot but feel that its brief record is worthy of a trial at your hands. I wish especially to call your attention to the fact that the conditions in which it has been most significantly successful are those very diseases that heretofore medical science has combated with only moderate success. My own cases illustrate that point. The first is a case of lupus vulgaris of twenty years' standing, having been under constant treatment for the past ten years, was getting progressively worse. The second, a case of lupus erythematosus of four years' standing, had been actively treated for two years and was in such a position that any destruction of tissue would be a mutilation.

Cases.

Case I. Mrs. Mary D. Aet. 46. Married U. S. Three children. One daughter has tuberculosis, otherwise family history is negative. Previous history negative. Present illness. About 20 years ago first noticed a pimple on right side of nose. A crust formed on this which was picked off. This process continued, a larger scab forming each time for several years; the ulceration enlarging very slowly. Ten years ago the diagnosis of lupus vulgaris was made, and since that time she has constantly been under treatment. Koch's tuberculin was injected, she was cauterized several times under anesthesia, and five years ago she underwent a very extensive plastic operation, always with negative results. On May 11, 1900, she came to my clinic, at St. Mary's Hospital, praying me to do anything, even an extensive excision, as the lupus patch was extending rapidly. An examination at that time revealed an extensive sloughing ulcer extending around what was left of the right side of the nose, and fleshy septum. Externally, a line of ulceration extended to the inner canthus of the right eye, and internally the mucous membrane and the tip of the inferior turbinate bone were involved. There was catarrhal conjunctivitis of the right eye, caused probably by the discharging pus from the inner canthus; and from the nasal part of the ulcer there was a foul-smelling discharge. For a year she had suffered greatly from pain.

At this time there had been very little reported work in the X-ray line. A few cases in Germany and one or two in England. I do not believe there had been any reported cases in this country,* and it was in a skeptical mood that I wished to try the X-rays, and while I did not promise nor expect any favorable results, the pa-

tient was willing to try anything. From the middle of May until the middle of July the nose was treated irregularly about twice a week. It showed the now well-known reaction from the first. In a short while the crusts began to dry up, the discharge ceased, and what was still more remarkable, the eye which had been partially protected by tin-foil, cleared up, although the spot continued above the inner canthus. The region of the inferior turbinate bone was still swollen to such an extent as to almost occlude the opening. The patient was not under treatment from July until November, when she came back complaining about her eye. The disease had become active here and this spot received five treatments. I then decided to endeavor to remedy the inside of the nose. The lupus in this location was especially difficult to treat because of its distance from the surface. Between November and the following July, for various reasons, the treatment was very irregular and did not average more than once a month. Since July she has had no treatment whatsoever. The greater part of the lupus patch has had no treatment since July, 1900, but there are one or two spots now that need treatment. In this case there was no pain as a result of the treatment, and the dermatitis excited was much more extensive than was necessary.

Case II. Mrs. Margaret Q. Aet. 33. Mar. U.S. Three children. Family and previous history negative. Present illness. About four years ago she noticed a small purple spot on the left side of the nose; this spot gradually became larger and was surrounded for a considerable space by a large red and inflamed area. Treatment was unsatisfactory, and three years ago last February she applied to the skin department of the Vanderbilt Clinic. She was treated for five months by various ointments and then carbolic acid cauterizations were inaugurated and continued for a period of four or five months. The patient complained severely of the pain and discomfort of this operation; in fact, from the first she was troubled with a painful sense of congestion; as she said, "the nose felt twice its size"; there was evidently a catarrhal rhinitis, for the nostril on that side was nearly always occluded. This treatment was finally stopped. She then underwent patent medicine treatment, and she says cuticura resolvent produced an intense inflammation all over her face. After her experience with this, all treatment was discontinued for a year. On June 27th she was referred to me for X-ray treatment.

Examination showed the bridge of the nose and contiguous portions of the face were in a diseased condition, and the overlying skin was deeply infiltrated and of a purplish hue. There were several small scattered areas, and an especially large patch over the right lower jaw. The bridge of the nose was first selected for treatment, a lead foil mask protecting the rest of the

face. The bridge of the nose received four treatments; the large patch upon the jaw was treated four times. Then a spot between the inner canthus of the eye and the right wing of the nose was given three treatments, making eleven treatments in all. There was very little dermatitis and the skin was not injured. She has had no treatment in four weeks. I do not think the case is yet cured, but the skin takes on a more normal appearance day by day. There was no pain, and the treatments lasted between ten and fifteen minutes.

Discussion.

Dr. Winfield: I am glad to have the opportunity of seeing the cases and hearing the doctor's paper. I have had no personal experience in treating skin diseases with X-rays. Regarding the correctness of diagnosis, there is no shadow of doubt about one being *lupus vulgaris* and the other *lupus erythematosus*. Darier, the French dermatologist, has made a number of microscopical examinations of skin that had been exposed to the action of the X-rays; he found the epidermis thickened in all of its layers, while there was atrophy of the hair-follicles and some of the glandular elements. His conclusions were that the ray acts as a powerful irritant, increasing the vitality of the least differentiated elements of the skin while the hair, nails, and glands are atrophied. The therapeutic deductions are these: the X-ray is useful in treating skin diseases where there are certain conditions present. First, when it is desired to produce atrophy of some of the appendages of the skin, as in *hypertrichosis*. Second, when it is necessary to stimulate the tissues, as in *chronic eczema*, or *lupus erythematosus*. Third, to destroy mycotic organisms, like the *tinea*s. Fourth, to destroy tissues of low vitality, as in *lupus vulgaris*. The best results obtained from the use of the X-ray in dermatological practice has been in the treatment of *hypertrichosis*, repeated sittings will eventually produce complete atrophy of the hair-follicle. The first case of *lupus* treated by this method was reported by Schiff of Vienna. The second, and the first in the United States, was by a former member of this Society, Dr. P. M. Jones of San Francisco.

The most extensive work being done in America in this line, at present, is by Dr. Pusey of Chicago, who has written quite extensively on the subject. In comparing this with the Finsen method, it would seem that the X-ray was the better of the two. The Finsen apparatus is expensive, the application is painful, it often being necessary to anesthetize the patient, a great number of sittings are required, which makes the treatment expensive, and the resulting scar is not as slight as that obtained by the X-ray. While there have been cures reported by both methods, there are no positive evidence that they are permanent. I doubt they will ever become popular, because of the expense, the com-

parative risk of application, and as good results can be obtained by well tried and simpler methods.

The doctor should be congratulated on the excellent results obtained in both of the cases, and I think the Society is to be congratulated on the fact that its younger members are doing original work and are bringing to it their results and deductions for discussion.

Dr. Gordon: I saw this case before Dr. Lee began his treatment. It was certainly a most unpromising case. It seemed without hope, and it didn't seem to me that there was anything more that could be done, and I saw it from time to time during treatment, and the result was certainly most pleasing, and a fine result, as you see it here—such that I have become a very enthusiastic advocate of this form of treatment, in watching this first case he has presented of twenty years' standing.

Remarks.

Dr. Lee: Mr. President, as to the method, it is very simple. I place the patient about twelve inches from the tube, and cover the face, with the exception of the part about to be treated, with lead foil, then turn on the current for about ten minutes. A point I wish to emphasize: It is unnecessary to cause a dermatitis.—*Brooklyn Medical Journal*, February, 1902.

*Note.—The editor here wishes to state that, as already reported in a paper read by Dr. G. G. Burdick, before the Electro-Medical Society of this city, and printed in this issue, "the first published report of the treatment by means of the X-ray was by Dr. H. P. Pratt of Chicago, in the *Chicago Medical Times* of July, 1896, which was reported by Dr. Finley Ellingwood."

A PRECURSER OF X-RAYS.

In the 31st volume of "Wiener Zeitschrift fur Kunst, Literature, Theater un Mode," edited by Dr. von Frank, No. 234, Nov. 23, 1846, page 938, is found the following very interesting notice:

"The Human Body Transparent! The Greek physiologist Eseltja has, according to the *Atheneum*, made the announcement that he has succeeded, with the aid of the electric light, in seeing through the human body. He claims that he has watched the disease processes in the intestines, also the digestive process, the circulation of blood and the movement of the nerves. If this 'Anthroposcope,' as he calls it, is more than a cheap advertisement, the old proverb, which says that no one can see into the heart of man, has been set at naught."

What must have seemed like a hoax to the journalist of that day becomes to us of great interest in connection with Prof. Roentgen's discovery.—*Chicago Pan-Path*.

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The Era will cover an extensive and exclusive field for makers and manufacturers of X-Ray appliances and Electric machinery, as the medical practitioners will be their best patrons.

NOTICE.

The March meeting of the Chicago Electro-Medical Society will be held at room 1233 Masonic Temple, corner State and Randolph streets, Tuesday evening, March 25, at 8 o'clock p. m.

MEDICAL JOURNALS.

Will you kindly place the American Electro-Therapeutic X-Ray Era upon your exchange list, and we will in turn send you our publication regularly with each issue?

CHICAGO ELECTRO-MEDICAL SOCIETY.

The ninth regular meeting was held in room 1233, Masonic Temple, February 25, 1902, at 8 p. m., President Burdick in the chair.

The minutes of the last meeting were read and

approved with a correction as to the place of meeting. The secretary was instructed to correct the minutes of the meeting of November 26, 1901, by adding the statement that the gentlemen who then made application for membership were elected.

A bill of four dollars for elevator service for the last two meetings was ordered paid.

The treasurer, Dr. Street, presented a report showing the amount of cash on hand; and called attention to the fact that the annual dues for 1902 were payable in January.

Dr. P. C. Clemensen, recommended by the membership committee, and Dr. J. C. Brubaker, by a committee of the whole, were elected members of the society.

An interesting and instructive paper was read by Dr. Gordon G. Burdick, entitled "Can Consumption Be Cured by means of the X-Ray?" The paper was discussed by Mr. Burch and Drs. Gilman, Grubbe, Hall, H. P. Pratt and Clemensen.

Dr. Burdick also exhibited a mechanical vibrator adapted to the alternating current.

On motion of Mr. Friedlander the executive committee was instructed to correspond with the Roentgen Ray Society of America regarding the proposal to hold its next meeting in Chicago.

The committee on scientific research presented a preliminary report on priority in X-ray therapeutics.

On motion the secretary was authorized to purchase all necessary blanks and stationery, and the treasurer was instructed to pay the hall rent regularly as it becomes due.

Adjourned at 10:10 p. m.

T. P. HALL, Secretary.

OBITUARY.

We regret to announce the death of Dr. Christian Fenger, one of Chicago's most eminent surgeons. He has been on the Faculty of the College of Physicians and Surgeons, the Chicago Medical College and Rush Medical College, and has served as surgeon in many hospitals. His articles in the medical journals have marked him as one of the leaders in surgery. In 1899 he was given an honorary degree by the King of Denmark.

We believe that he was yet skeptical regarding the therapeutic value of the X-rays, though he recognized their value in diagnosis.

Dr. Fenger's kindness to poor patients is well known. One of his former students tells this story: The doctor had received a telephone call to the house of a rich man, whose wife was ill. Being overworked, the doctor had referred him to another physician. Shortly after a poor man came into his office and told him a pitiful tale of his sick wife. He at once drove to the poor man's house.

Frequently patients coming to his dispensary were sent home in his carriage.

HOW TO MAKE YOUR STATIC MACHINE WORK IN MOIST ATMOSPHERE.

The man with a static machine, usually, and, in fact, nearly always, has troubles of his own, especially during the hot, moist weather of the months of July and August, and along rivers, lakes and the coast.

Static machines are variable and fickle, but are governed by certain laws which must be obeyed. Moisture and dust are the greatest troubles to contend with. No matter how tight the case may be, dust and moisture will get into it. Some machines are less susceptible to the atmospheric conditions than others, and notwithstanding the claims made by makers, there is no machine that can be depended upon to generate always under every circumstance and condition. We may so alter the circumstances and modify the conditions that we can be reasonably sure of our machine working, but never be absolutely certain of it.

Some machines have a smaller machine, or charger, inside the case, in order to start the current and charge the larger plates, but even then they sometimes fail to work. The glass and mica plates should be covered with a coating of shellac. Hard rubber plates are left bare. Various methods have been tried to keep the air inside the cases free from moisture, such as lamps, incandescent lights, electric coil heaters, jars of sulphuric acid, common lime, and chloride of calcium, but lamps, lights and coils heat too much, acid gives off destructive fumes, lime dust flies. The most generally used and probably the most satisfactory, when all else is considered, is fused calcium chloride. This is not the ordinary chloride of lime of the stores, which is chlorinated lime, or bleaching powder, which gives off the fumes of chlorine gas, which will ruin the metal parts, but the fused chloride of calcium which comes in rough, hard lumps. It should be thoroughly baked, bone dry, in a deep, flat granite or earthen vessel and kept inside the case all the time. Being very hygroscopic, it quickly absorbs all the moisture in the case and keeps the air within quite dry. As it gets wet it becomes soft and sticky, and should then be removed and again thoroughly dried or baked. Do not allow it to get on the stove or metal part, as it will ruin it, but when carefully handled it is safe and reasonably sure. The same calcium can be used over and over indefinitely. Probably the safest, quickest and cheapest way of drying the case is the jar of cracked ice and rock salt. Do not use snow or common salt, or forget the saucer, but use as follows: Take a one-quart glass fruit jar with screw top, fill with a mixture of powdered ice and rock salt, screw down the cover and wipe the moisture from the outside of the jar; place the jar in a saucer or bowl inside the case of static machine, close the door and set the machine in motion, keeping the plates moving until the machine begins to generate at its best.

After, say an hour, when the ice is fairly melted, remove the jar and quickly close the end door so as to prevent the outside air from getting into the case. This simple remedy will dry the air within the case in from five to twenty minutes. Materials for this experiment are accessible to every physician at all seasons of the year, and the application of this remedy is entirely free from the danger of corrosion of the metal parts of the machine and the annoying care and labor of frequent drying and baking of chloride of calcium.

Apply the remedy when next your machine refuses to generate, and it will insure the very best of results in the operation of your machine on any and every day in the year.

Simply holding a pledge of absorbent cotton against the revolving plate while in motion will often cause the machine to generate at once, especially the rubber plate machines.—The Electro-Therapeutist, January, 1902.

A GREAT X-RAY IMPROVEMENT CLAIMED.

E. W. Caldwell describes in the current Electrical Review a new apparatus designed for stereoscopic vision for X-rays. It has been developed in the laboratory at the Bellevue Hospital Medical College, New York city.

By using two sources of X-rays in the same tube, each eye views independently the shadow, with the result that the picture stands out distinctly, showing all the space relations of the objects viewed.

It is thought that this method will be of the utmost value in surgery, permitting immediate examination of broken bones, etc., as if they were viewed by the eye with their positions accurately indicated, instead of in silhouette effect, as has been the case heretofore.
—N. Y. Times.

CANCER CURED BY X-RAY.

NEW HAVEN PHYSICIAN DISPERSES A GROWTH OF THREE YEARS.

That cancer can successfully be treated by means of the X-ray has again been demonstrated by Dr. C. E. Skinner at New Haven, Conn., who has just cured L. S. Manville after a course of treatment of five weeks' duration.

The cancerous growth was of three years, and was not susceptible to the usual treatment. It was as large as two ordinary apples, eleven inches wide and seven inches deep. It had arrived at a stage where Mr. Manville's family physician thought he was certain to die in a few weeks. The physician suggested X-ray treatment.

To-day a blemish on the left side of his face and neck and only a skin scar are all that remain to mark the cancer.

THE NEW YORK STATE CANCER LABORATORY.

In June of last year this laboratory—which was the first ever organized for the collective and scientific study of cancer, and which has been followed and imitated in England, Germany and Russia—passed under the control of the New York State Board of Health, after an independent existence of over three years. During that time they have done a vast amount of research work, in co-operation with foreign societies and laboratories; and they have been honored by the visit of a special investigator two years ago from the National Cancer Society of England (who, upon his return, reported most favorably upon the work done here), and by the appointment of two of their staff—Dr. Roswell Park and Dr. H. R. Gaylord—as foreign members of “The German Society for the Study of Cancer.”

In the Fourth Annual Report of this Laboratory, Dr. Roswell Park—who, it will be remembered, was one of the physicians in attendance upon our late President McKinley—writes:

The results of our past year's work have been to strengthen our ever growing convictions that cancer is an infectious disease, which are both sustained and confirmed by the work of leading observers all over the world—i. e., men who are everywhere regarded as authorities. Moreover, we have never seen any reason to alter the statements upon which in the beginning this laboratory was largely founded—namely, that cancer as a disease is on the increase. This has been abundantly shown by returns from various other state boards of health, as well as by statistics from nearly every civilized country in the world where adequate records are kept. If cancer prove to be a parasitic disease, the importance of its recognition may be perhaps better estimated from the good that has already come from the discovery of the parasites peculiar to malaria and yellow fever, since now that they are known we have learned how to prevent and eradicate these diseases.

Much has been said in recent literature of the value of the Roentgen or X-ray in the therapy of cancer. I would like to report that generous friends have offered to supply the necessary apparatus for experimentation in this direction and that the General Hospital will supply the space and the accommodations required for the same. I shall hope, therefore, with the next annual report to be able to say something upon our results with this somewhat hopeful remedy.

The scientific world will await with interest the publication of their next Annual Report.

Dr. Charles L. Leonard of Philadelphia writes in the Medical News of the advances made in diagnosis by the X-ray of renal and ureteral calculi. Cases fre-

quently come to the physician that are obscure, but which point to some difficulty of the urinary tract beyond the ken of the doctor. Often these are referred to the surgeon for “exploratory incision, without further effort toward diagnosis.”

Dr. Leonard has well demonstrated that “the accurate determination of the position and number of the calculi has resulted in limiting the field of operation, and in rendering the intervention more accurate and complete, while it excludes the danger that menaced from the unrecognized involvement of the other kidney or ureter in the calculous disease. It is no longer necessary to perform an exploratory nephrotomy upon the healthy kidney before doing a nephrectomy, or to open a healthy kidney in the search for a calculus that is obstructing the ureter lower down. Incision into the kidney, during an exploratory or any other operation, is only justified by the detection of a calculus by the Roentgen method or an obvious pathological lesion.

“The chance of error in the negative diagnosis is very slight, and the calculi that may be overlooked are so small that their final expulsion is certain. There are as yet patients in whom it is impossible to make an absolute negative diagnosis on account of their size. In suitable cases hydronephrotic and displaced kidneys have been demonstrated; while calculi have been detected in patients weighing over 200 pounds. In such cases when great detail is demanded in the skiagraph or the difficulties to be overcome are out of the ordinary, it is sometimes necessary to make repeated exposures before a satisfactory result is obtained. When, however, such a result is obtained, it enables the diagnostician to demonstrate the accuracy of his results to those capable of appreciation.”—The American Medical Monthly, February, 1902.

KILLS CANCER BY CUTTING OFF BLOOD IT FEEDS ON.

For a heroic surgical treatment of cancer Dr. Robert H. M. Dawbarn, visiting surgeon to the city and Poly-clinic hospitals, has been awarded the Samuel D. Gross prize of \$1,000.

The prize is awarded by the Philadelphia Academy of Surgery, which is trustee for the fund.

Dr. Dawbarn has found an operation for malignant cancerous growths in the head where such growths cannot be cut out.

The carotid arteries convey the main blood supply to the head. The main carotids divide the neck into branches. The operation consists in cutting out external carotids in both the left and right sides of the neck, thus depriving all of the head save the brain and eyes of the main supply of blood. The operation is one which a few years ago would have meant death to the patient, but now is entirely practicable.

The cutting off of the blood supply not only stops the growth of the cancer, but, by continued deprivation of nutriment, causes the gradual but steady lessening of the growth.

This heroic treatment has been as successful as it is daring. The first person operated upon by Dr. Dawbarn went under the knife seven years ago. He had a malignant growth of the pharynx. He is now in good health and able to attend to business every day.

It is said that if this plan of treatment had been known at the time of General Grant's last illness the life of the illustrious soldier might have been greatly prolonged and his sufferings much lessened.—Rocky Mountain News.

"X-RAY BEATS THE DOCTORS."

We copy the following from "The Daily News" (Jan. 25), in an article treating upon the lecture course instituted by that enterprising paper:

Charles Keim, a lad who lives in 25th place, thanked the Daily News last night for providing a lecture in which he and many others saw a bullet in one of his arms after doctors had probed for it in vain. All the 800 persons at the John Spry school, Southwest boulevard and West 24th street, saw their own bones for the first time with the aid of X-ray apparatus. The "coil," the largest part of this apparatus, was made especially for the Daily News lecture courses, which opened last night in eleven centers.

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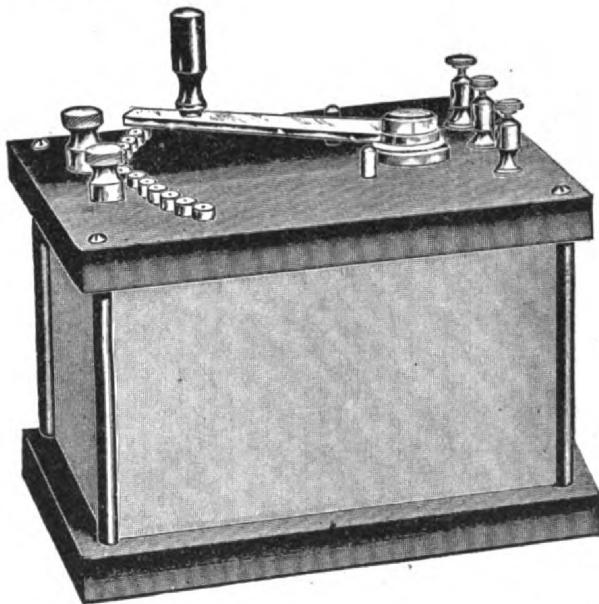
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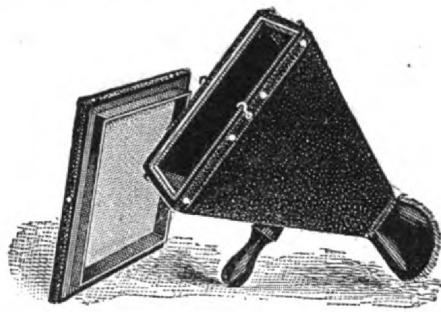
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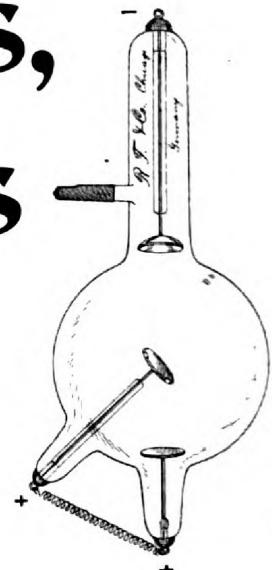
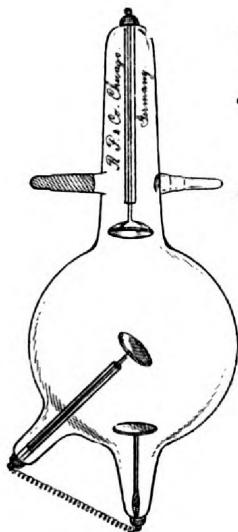
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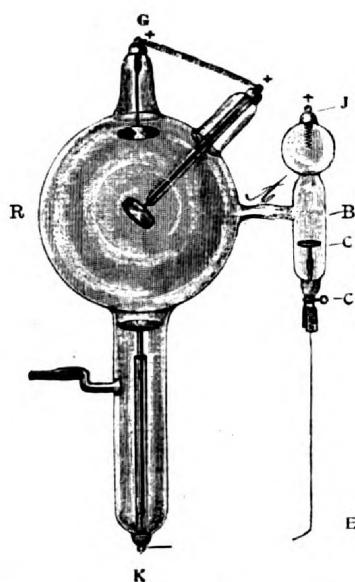
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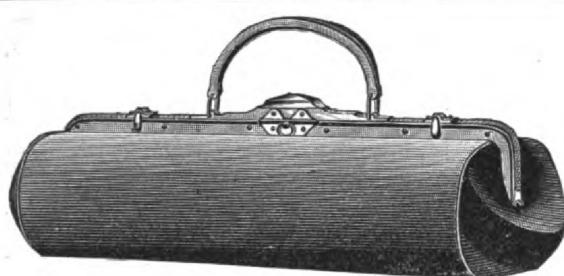
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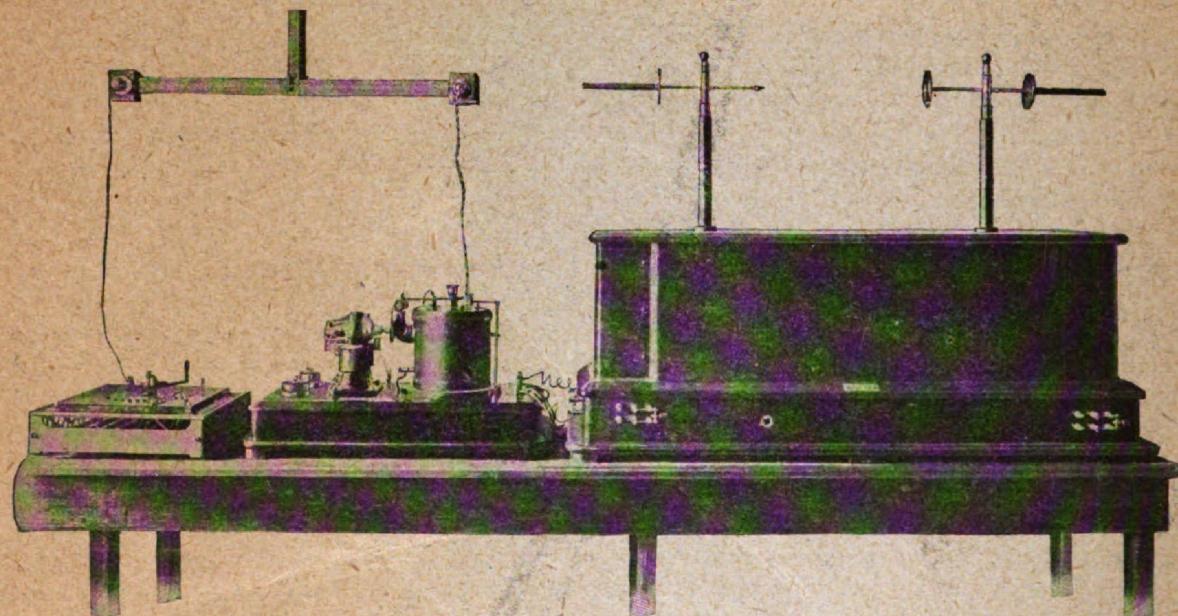
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CHICAGO, DECEMBER, 1902.

No. 12.

ORIGINAL CONTRIBUTIONS.

THE ROENTGEN RAY AS A THERAPEUTIC FORCE FROM A CLINICAL STANDPOINT, WITH ILLUSTRATIVE CASES.*

By John B. Murphy, A. M., M. D., Professor of Surgery, Northwestern University Medical Department, etc., Chicago, Ill.

To present the subject of the Roentgen ray from either a therapeutic or clinical standpoint is too exhaustive a subject for one evening's discussion. I have therefore selected a few practical things in connection with the work in this particular sphere. It seems to me that our knowledge of the therapeutic effect of this force has to be cumulative; that is, that we must have a few experience meetings like this one before we can tell just where we are. And it is for the purpose of adding to this experience that I am here before you to-day.

In the use of the X-ray we first applied it to the fracture element of surgery and in that field we have found it to be of enormous benefit in throwing light on the conditions of a fracture. We have also found, however, that it has some failures and some very disastrous failures, too. One of the striking features of this particular type of work is illustrated in these two pictures (indicating). One of these pictures is that of a fracture of the radius with apparently no disturbance whatever of the ulna. The second picture is another illustration of the same arm. This case was referred for treatment to a surgeon who was not a general surgeon, but a general practitioner who did surgical work. He felt himself thoroughly competent to treat this fracture of the fore arm, and there can be no question that he was competent; but he was at fault in placing too much reliance in his X-ray picture, which shows that there is no fracture of the ulna. Neither of the two pictures shows any fracture or deformity of the ulna. He applied a dressing, using the unbroken bone as a splint for the broken bone. Upon removing the dressing he found to his great surprise and astonishment that the arm had a distinct and decided curve. With the fluoroscope he discovered that there was a distinct deformity and fracture of the ulna, which showed itself about ten days after the original injury. That shows us one of the errors of the X-ray in fracture work. We should not place too much reliance on

it, especially when the clinical evidence is to the contrary.

I do not wish to speak too much of the bone elements of the X-ray, except from a diagnostic standpoint, other than in connection with fractures. Is it of value from other standpoints? Yes, and of a most decided value. To support the position I take in this matter I will show you some skiagraphs of tuberculosis.

You are all well aware that in relation to tuberculosis in the neighborhood of joints it is often a very serious question whether the bone is involved at all, or whether it is purely a synovial tuberculosis. It has been my experience in tuberculosis of joints that where I have seen the case early I have always found that it is, and particularly in the knee joint, primarily a lesion of the bone only, and that it becomes a synovial lesion as a secondary matter. I will cite a striking illustration of this.

A patient was admitted to the hospital as a case of tuberculosis of the synovial membrane with no primary focus in the bone. He was treated by injections into the joint with the expectation that these would cure him, but they had no effect, and the skiagraph subsequently showed that the carpal bones were involved. Now we learn, with the assistance of the X-ray, just what class of cases are going to be benefited by the injection of formalin, iodoform and glycerin. We have been injecting this solution for a good many years and we have found that occasionally a case would improve and get perfectly well, whereas the next case was not affected in the least by the very same treatment. It was a little difficult for us to understand how that could occur. To-day the X-ray informs us just when we are dealing with a case of primary synovial tuberculosis, where we have hydrops of the knee joint, and a tuberculosis of the synovial membrane only. We inject that case with the emulsion of formalin, iodoform and glycerin and the patient goes on to recovery without interruption. When

*Read before the American Roentgen Ray Society, Dec. 10.

we have a case of the type where the disease has not yet ruptured into the joint, and where the joint involvement is merely an effusion without any communication with the lesion in the bone, there is practically no relief whatever from the injection of fluids into the joint, and we should not expect any, because they do not come in contact with the primary tubercular lesion which is situated in the bone.

The X-ray is not only an aid in making a differential diagnosis in these cases, but it is also an aid as a therapeutic agent in tuberculosis of the bones and joints. I have had a very gratifying experience with it in two cases of tuberculosis of the knee joint involving the synovial membrane. They were injected without producing the desired effect. The X-ray was then used, and one case, in which the effusion had existed for nine months, was discharged from the hospital twenty-one days after admission without a particle of effusion or the slightest diminution in the range of motion of the affected joint. I never got such a result before where I simply injected the mixture of formalin, iodoform and glycerin. By putting on the X-ray and stimulating the production of new tissue, as we know the X-ray does, there was almost immediate restoration of the synovial membrane to its normal function of secreting and absorbing so that there was not a particle of retained effusion in the joint.

Not alone in this type of tuberculosis of bone has the X-ray shown its striking features, but I also have

seen cases of tuberculosis of the spine in which its use was followed by the most striking and gratifying results. Tuberculosis of the spine is occasionally accompanied by a paraplegia. That paraplegia has heretofore been attributed to the kyphosis and the compression of the cord produced at the point of bending. Now we know that it is not the deformity of the bone at all that produces the paraplegia, and that the compression occurs from the formation of a tubercular granuloma from the body of the vertebra anterior to the cord. When the tubercular condition ruptures through the compact bone it forms a granuloma within the spinal canal, and it is this granuloma that produces the compression of the cord and the paraplegia.

The question came up in Victor Horseley's citation in his cases of tuberculosis of the spine. He went in behind this granuloma, doing a laminectomy, curetted the body of the vertebrae, opening not the dura but the

spinal canal, and in this way relieved the pressure. I have done that operation for the relief of pressure three times, twice with good results and once with a failure. It was this particular case in which the operation failed to give the expected relief, that led me to the use of the X-ray for its therapeutic effect in just this class of cases. You will pardon my citing a case, but I do so because it is a forcible one in illustrating the use of the X-ray in this very serious lesion.

The patient, age 36, a farmer, was lifting a hog from a sling when he suddenly felt a pain at about the fifth dorsal vertebra. The pain gradually increased in severity, although he was able to be about for a week. I saw him 38 days after the accident, as he called it. He said that he did not fall down when he had the pain, nor did he drop the hog, but carried it to the place where he had originally intended it to be. When I first saw him he had a beginning paraplegia from the point of the injury down. I could not believe that a tuberculosis of the spine originating in an adult could advance with such rapidity as to produce a granuloma sufficiently large to compress his cord in that short period of time. Consequently I made a diagnosis of sarcoma, because we know that an osteosarcoma following trauma can develop with great rapidity.

With a large hypodermic needle I made a lateral puncture in between the ribs, through the pleural cavity and into the body of the vertebra and succeeded in getting a drop of pus and tubercular debris. Dr. John Deaver, of Philadelphia, who was in Chicago at the time, saw the case with me and confirmed the diagnosis. The next question was, what could we do for that man other than to do a laminectomy to stop his rapidly advancing paraplegia. After a thorough consideration of the subject I decided to put him on the X-ray treatment. The first few days after its application his paraplegia continued to get worse. After the third application of the ray his pain disappeared, and after twenty-five applications his paraplegia had entirely disappeared and he was able to go home. To show you how thoroughly it disappeared, he went hunting, shot chickens and incidentally shot off a part of his foot. I also used the X-ray to hasten the healing of his foot.

The second case was one on which I had performed a laminectomy a year before. There was absolutely no improvement; in fact, he was worse after the operation than before. There was already a mixed infection at the time of operating and a discharging sinus resulted. There had been a number of fragments of bone discharged in the year that had elapsed. I curetted, but without any result, and I finally put him on the X-ray to heal his bone tuberculosis. Twenty-one applications of the ray closed the sinus completely, so that instead of having a rather profuse discharge there now was none. It did not help his paraplegia any, nor did we expect that it would, because his cord had been destroyed by the tuberculosis and the mixed infection which had been present from the beginning.

The third case was a patient, paraplegic, suffering intense pain and taking one-third of a grain of morphine every two hours to secure partial relief. He was unable to move and was confined to bed all the time. He was put under the X-ray. The first two applications (and that is one of the peculiarities of the X-ray), stopped his pain, and although it did not remove

the tumor, yet it stopped its rapid growth. I received a report from that patient to-day. He has had twenty-three applications of the ray and is now walking about on crutches. From the second day of the application of the ray he has not had a hypodermic of morphine. I think I can safely say that the prognosis in this case is exceedingly good.

These are three cases of tuberculosis of the spine associated with granuloma in the spinal cord, which I think are very striking from a clinical standpoint, particularly as to results and the relief given the patient.

The value of the ray in the diagnosis of lesions of the chest as aneurysms, etc., is not necessary for me to dwell on, but its use in the diagnosis of renal calculi is well worth considering. There is an uncertainty in the diagnosis of a renal calculus, and that uncertainty depends upon two conditions. First, defects in the plate, and, second, deviations in the density of the calculus. I am pleased to see here to-day Mr. Fuchs, the man with whom I have collided most frequently as to the absence or presence of calculi in his pictures. I always tell him that he sees everything in his pictures, and I always take the opposite side, so that he will more positively prove that what he sees is there. Nevertheless errors will occur. In looking over the reports of an English hospital I find that in about eight per cent of cases in which the X-ray showed a stone the surgeon was unable to find one. First, because in some of these cases the stone was not there, and second, in a number of them the stone was there but the surgeon was unable to find it. We have had a few striking examples of that kind occur in this city where the stone was pictured by the X-ray. An exploratory operation was made, but the stone was not recovered. A second picture again showed the stone and when the patient was operated again the stone was found. Still, I believe that many of the so-called errors of the X-ray are due to conditions over which we have no control, such as accumulations in the alimentary tract that will give a shadow of a stone on the plate, etc.

The question of the treatment of malignant disease with the X-ray is one that concerns us most. I believe that that is the one condition where we had hoped that the X-ray would come to our rescue. Surgeons are generous people and they would gladly give all the malignant cases to any one who could hold out a single ray of hope. The X-ray has not, however, been without some result. I have brought a slide taken from a specimen that was very instructive to me, a case of very large carcinoma of the breast. The tumor appeared to be about as large as an ink-well and was covered by the skin and surrounding tissues. The patient was a very old lady, and as I considered the case an inoperable one I referred her to Dr. Wm. Allen Pusey, of this city, for treatment with the X-ray. It was really remarkable to see the rapidity with which the size of that tumor diminished. After about twenty-

one or six applications the patient had an attack of gastritis, which persisted until she finally succumbed.

We succeeded in recovering the specimen of the tumor and it was very instructive. First, because of the fact that the ray reduced the size of this large mass to one $2\frac{1}{2}$ centimeters wide and 4 centimeters long. Second, because of the changes in the tumor itself. We sectioned it and when we came to examine the microscopic specimen we found that the changes were of two kinds. First, an increase in the connective tissue; second, a decrease in the cellular elements of the carcinoma. The connective tissue stroma became enormous in proportion to the cellular elements, but still the shape of the cells in their various epithelial pockets did not appear to be changed. It did not show that there was any strangulation of the cells by the contraction of the new formed connective tissue, and yet there were changes in the cells. The protoplasm had undergone a change. The cells showed vacuolization, but the nucleus did not seem to have changed at all. It seemed to be the part of the tissue which was the least affected. Now it has been our belief for a long time that in the repair of carcinoma the X-ray acts by destroying the cell, or by an impression produced on the cell which prevents the regeneration of cells of the same type. The cells in this tumor were all changed in about the same way.

Another interesting feature in this case was the fact that the glands had not changed in the least through the application of the ray. They were typical carcinomatous glands, and even the gland just outside of the breast, which must have received the full force of the ray, was not affected by it in any way. That is an important feature the interpretation of which time will have to clear up.

This was the most pronounced effect in a deep lesion, that is, a lesion beneath the surface of the body. We have had in Mercy Hospital cases of typical carcinoma that were not affected by the X-ray. We have also had a considerable experience in cases of deep-seated carcinoma of the intestinal tract without any pronounced effect. Of cases of superficial epithelioma I distinctly recall one case of epithelioma of the eyelid which was entirely healed, one of the most perfect repairs I have seen.

We have not even learned, however, in treating lupus with the X-ray just what class of cases are going to get well and those which are not. I remember one case we had in Mercy Hospital that did not get well. In fact, the disease continued to develop and new foci appeared and continued to form during the treatment. We subsequently treated the case by a plastic operation. We will learn the differential part of this work when we become a little more familiar with the disease. In the treatment of the deep-seated carcinomata we must learn to change the tension of

the tube, either increase or lower it. It seems to me that if we have a force in the X-ray that can aid us on the surface that we should in some way get the same effect on the deeper lying tissues.

There is another field of usefulness for the X-ray, one that has been but little cited in the literature, and that is the treatment of deep fistulae—intestinal fistulae. That is another class of conditions that annoys the surgeon very much. I have had a number of them and it is remarkable how quickly the X-ray will by stimulation increase the amount of connective tissue and close the sinus. More work can be done along this line with profit to every one, the practitioner as well as the patient.

DISCUSSION ON DR. MURPHY'S PAPER.

Dr. E. H. Grubbe, Chicago, said that in tubercular lesions of bone the X-ray has in the hands of the electro-therapist proven very beneficial. As to fistulas, he has had some very encouraging results.

Dr. A. M. Phelps, of Battle Creek, Mich., in the course of his remarks cited the case of a lady suffering from an extensive carcinomatosis who was treated by the X-ray. She had a perceptible enlargement in one breast for over three years, but did not consult a physician until about six months ago. The entire breast was involved, the glands in the axilla and those under the pectoral muscles; the uterus and liver were enlarged and nodular. The case was considered inoperable and the X-ray was suggested as a last resort. A medium tube was used and the ray was applied alternately over the breast, the liver and the uterus. After the third or fourth application all pain disappeared, the patient gained in strength and felt better. After three months' treatment the skin had turned a deep brown, but was not burnt or inflamed. The tumor in the breast and all the enlarged glands shrunk considerably. The fundus of the uterus was nearly normal in size and only two small nodules were found in the cervix. The liver also diminished in size considerably, but the patient finally succumbed. The autopsy confirmed these findings in every particular. Microscopical examination of the tumor masses showed carcinoma.

Dr. Gordon G. Burdick, of Chicago, related a case of supposed neuroma of the brachial plexus which was treated with the X-ray for about four months and as no improvement was apparent an operation was suggested and accepted. The tumor was removed, and on examination was found to be a sarcoma, which had begun to undergo a fatty degeneration. He believes that if the treatment had been continued a cure would have resulted. The tumor was removed eight months ago and there has not been the slightest sign of a recurrence. Another case of extensive osteo sarcoma of the shoulder joint; the arm fixed; intense pain; requiring the frequent injection of morphine; improved rap-

idly under this treatment by the X-ray. The patient is free from pain, there is no apparent progress in the growth and the arm is as useful as the well arm. A third case was operated a number of times and recurred after each operation. Under the X-ray the growth shrunk to one-third its former size, the patient is free from pain, has increased in weight and feels well. The last case cited was one of sarcoma of the radius. It soon became soft and diminished in size, but in spite of this excellent progress the patient was persuaded by another physician to submit to amputation. Three successive amputations were made, the last an exarticulation of the shoulder, and after each there was a recurrence. The patient did not return for X-ray treatment.

Dr. J. P. Marsh, of Troy, N. Y., cited a case of melano-sarcoma of the left shoulder and chest with numerous metastases in the skin. The tumor had originated in a mole which had been excised. When the X-ray treatment was begun the leucocytes were counted and numbered 18,000. After each treatment there was a falling off of the leucocytes of about 2,000. The patient became rapidly worse and finally died. The speaker found by observation of cases of this kind that if the leucocyte count goes up the prognosis is favorable. But if the leucocytes diminish the outcome is always bad. He advocated the blood count as a guide in making a prognosis.

Dr. Clarence E. Skinner, of New Haven, Conn., said that sarcomas do not respond alike to the X-ray. He cited a case of sarcoma of the neck, ten by seven inches in size, which had existed for three years that did well after only seven weeks' treatment, the most rapid cure of cancer he had ever seen. The diagnosis was confirmed microscopically. As a contrast he mentioned the case of a man with a sarcoma of the parotid gland, which had recurred after operation. He was treated in the same way as the previous case, but the result was just the opposite. He suggested that this may be an idiosyncracy to the influence of the X-ray.

Dr. J. D. Gibson, of Birmingham, Ala., stated that some of the most beneficial results he has ever seen have been in cases of melano-sarcoma. He had a case, in particular, of melano-sarcoma under the left ear four and a half inches in diameter, which was of more than passing interest. He was operated three times and the tumor recurred again. Then he used cancer paste, but without receiving any benefit. When he applied again for operation several prominent surgeons refused to operate, telling him that he had only a few weeks to live. He then came under the speaker's care and was treated with the X-ray. The mass sloughed out from under the skin, became smaller and smaller until it measured only one-half inch in diameter. He went home after three or four months in a very much improved condition and continued the treatment with

a physician who knew little or nothing about the use of the X-ray, with the result that the patient died in about two weeks. The speaker did not learn the cause of death, although he is convinced from the progress the case was making that in proper hands it would have gone on to ultimate recovery. He believes that every case of cancer that is not cured would have been if the treatment had been given properly.

Dr. K. Dunham, of Cincinnati, O., makes it a rule to examine the blood of every case and he has found that the leucocyte which should be watched is a large faintly staining mononuclear cell. When this leucocyte diminishes in number he feels encouraged, especially when the polynuclear leucocytes have increased. If these latter diminish in number there is ground for fearing the outcome of the treatment.

Dr. George P. Edwards, of Nashville, Tenn., has used the X-ray in a number of cases of tabes with most excellent result. In several cases there has been a return of the lost knee jerk with marked diminution of the ataxic symptoms. He uses the high tube over the lower dorsal and lumbar vertebrae, making the exposure in the ordinary way.

Dr. J. Rawson Pennington, of Chicago, reported a case of cancer of the rectum in which an inguinal colostomy had been performed. Four months after the operation the rectum was completely closed. The speaker curetted and removed a great deal of friable tissue. Three weeks later he began treatment with the X-ray, using the high tube and making the application alternately from above and over the perineum and with the induction tube passed into the rectum. In about seven weeks the rectum was again closed; he curetted again, removing more of the mass. The man was feeling better and improving. When he curetted a third time he found the rectum was filled with a firm fibrous tissue.

Dr. Murphy, in closing the discussion, said that he did not doubt that the X-ray was a great therapeutic agent, but that its real limitations and exact method of application were as yet unknown. It is important to make a correct diagnosis, to learn the exact pathology of the processes treated, and, if possible, to make microscopic specimens of the growth after treatment in order to see what changes have taken place as a result of the treatment. We should always endeavor to keep on a firm pathologic basis and if we keep on that the X-ray worker will ultimately meet with success.

ANNOUNCEMENT.

After due consideration we have decided to adopt magazine size for our journal, beginning with the January number of the third volume, and believe that such a change will be welcomed by our numerous readers.

ELECTRICITY IN THE TREATMENT OF CATARRHAL DEAFNESS.*

By Albert H. Andrews, M. D., Professor of Otology, Post-Graduate Medical School of Chicago; Professor of Diseases of the Ear, Nose and Throat, Illinois School of Electro-Therapeutics, etc.

The combination of deafness and tinnitus comprises a group of symptoms probably more prevalent than any other ear symptoms of which patients complain. These symptoms may be caused by three separate and distinct conditions within the ear—namely, disease of the internal ear, sclerosis of the middle ear and chronic non-suppurative otitis media or so-called catarrh of the middle ear. Cerumen or other foreign bodies in the auditory canal may also produce deafness and tinnitus, and conditions entirely independent of the hearing organ itself may be accountable for these symptoms, more especially the tinnitus. However, the latter cases are beyond the scope of this paper. Disease of the internal ear forms a class by itself and it is necessary to consider its treatment separately. Sclerosis, considered apart from inflammatory conditions, is not amenable to any form of treatment which we have as yet been able to institute. Catarrhal inflammations of the middle ear are all more or less amenable to treatment. It is this particular phase of the subject which we are to consider to-night.

It is a well known fact that the anatomic arrangement of the middle ear renders it liable to certain forms of disease peculiar to itself. The middle ear is an air-filled cavity, lined with mucous membrane and situated entirely within the temporal bone. In its normal condition it has but one means of communication with the external world—the Eustachian tube. When the Eustachian tube is occluded the middle ear becomes a closed cavity, and as a result is subject to certain well-defined pathologic changes. The Eustachian tube is on an average about one and one-fourth inches long. Its outer three-fourths is a bony canal lined with mucous membrane. Its inner one-fourth is entirely within the soft tissues of the naso-pharynx. The mucous membrane lining the Eustachian tube is thrown into longitudinal folds. Its blood supply is very abundant and comes principally from the pharyngeal direction. Any pathologic condition about the pharyngeal meatus is prone to produce the same condition of the mucous membrane lining this canal. Fortunately, however, the tissues immediately surrounding the meatus seem to be less liable to the ordinary disease of the nose and throat than is the nasal mucous membrane on the one side and pharyngeal mucous membrane on the other. In ordinary acute rhinitis, extending to the post-nasal space, the Eustachian tube is sure to become more or less obstructed.

*Paper read before the Chicago Electro-Medical College, Nov. 25.

In chronic naso-pharyngitis, extending into the tube, the mucous membrane lining this canal passes through the same pathologic changes as do the tissues affected by chronic inflammation in any other part of the body. A patent Eustachian tube is essential to the hearing function. Occlusion of the tube produces a feeling of fullness in the ear, with slight deafness. Whether the deafness will disappear or whether it will increase depends entirely upon conditions within the Eustachian tube. When the tube is occluded for any considerable length of time certain progressive changes occur in the middle ear, a full understanding of which is necessary to their rational treatment. The first change resulting from occlusion of the tube is the absorption of air from the middle ear. The result of the absorption of air is the lessening of the air pressure within the tympanic cavity, and the air pressure from without now being greater than the pressure within the cavity, the elastic drum membrane is crowded inward and the condition results which is known as retraction of the drum membrane. A retracted membrane cannot vibrate freely, and were this the only change occurring impairment of hearing would result. However, the lessened air pressure produces other changes even more disastrous to the functions of the middle ear. It is said that nature abhors a vacuum. Whether this be true or not, nature does seem to make an effort to restore the equilibrium of pressure on the two sides of the drum membrane. It being impossible for air to reach the cavity of the middle ear, nature does the next best thing and attempts to fill the cavity with the only movable substance at hand, the blood. The blood being in tubes or vessels—arteries and veins—and these vessels having elastic walls, they become distended, and the condition results called congestion. In long-continued passive congestion, or chronic inflammation in any part of the body, certain changes take place, chief among which is proliferation of connective tissue. This proliferation of connective tissue occurs in the walls of the blood vessels and around the blood vessels. The tendency of all connective tissue, whether normal or pathologic, is to contract with age. And this connective tissue, being no exception to the rule, reaches a period after a time when contraction begins. The result of the contraction of the connective tissue in the walls and around the blood vessels is a lessening of the lumen of the blood vessels, and consequently a lessening of the blood supply to the part. As a result of the lessened blood supply we have lessened nutrition, and as a final result of the lessened nutrition we have that retrograde change called atrophy.

Clinically the pathologic changes occurring in this disease may be divided into three stages: The first, or simple stage; the second, or hypertrophic stage; the third, or atrophic stage. The line of demarcation between these stages is not clearly defined, but one

gradually merges into the succeeding stage. The simple stage includes all the changes up to the beginning of the proliferation of connective tissue. The hypertrophic stage includes proliferation and contraction until, as a result of the lessened nutrition atrophy begins.

So long as the origin of the trouble—the Eustachian tubal occlusion—continues, these pathologic changes are sure to follow. Without stopping to discuss the symptoms of these different stages, let us pass directly to the consideration of the Eustachian occlusion. In acute non-purulent diseases of the naso-pharynx extending to the Eustachian tube the treatment of the naso-pharyngitis is usually sufficient, no special treatment of the Eustachian tube being necessary. The first stage in chronic inflammation of the Eustachian tube is passive congestion. There are many remedies which may be used for the relief of this congestion. Usually in this stage electricity is not necessary, but should it become desirable to use electricity the copper electrode with positive galvanism would be the plan adopted. After the inflammation of the Eustachian tube has reached the hypertrophic stage electricity will be found of decided value. If treatment is instituted early, the positive current to lessen the blood supply and stop the formation of connective tissue is indicated. After this it will be necessary to use negative galvanism to bring about the absorption of the connective tissue already deposited. If treatment is instituted late in the hypertrophic stage, when the proliferation of connective tissue has already reached its limit, the copper electrode with positive galvanism is not indicated, but the negative current is used for its solvent effect upon this abnormal connective tissue. When the inflammation in the Eustachian tube has reached the third or atrophic stage one of two things will be found to exist. First, if the atrophic process begins in the periosteum and extends to the mucous membrane, the mucous membrane will be found firmly adherent to the bone and the Eustachian tube will be abnormally patent. Second, if the atrophic process begins in the mucous membrane lining the tube, annular or other strictures will result. When the Eustachian tube is abnormally patent no treatment of the tube itself is indicated, but if it is occluded either by inflammatory exudates, deposits of connective tissue or by strictures, due to contraction of connective tissue, then treatment of the tube becomes absolutely necessary before improvement in the hearing can result.

The special instruments necessary for the application of negative galvanism to the Eustachian tube are a suitable catheter, a set of gold wire olive-tipped bougies, some arrangement for attaching the cord to the bougie, and a measure for determining the progress of the bougie through the Eustachian tube. The catheter should be of hard rubber or of silver carefully insulated. Rubber tissue wound about a metal catheter

has been recommended, but my observation is that it is not sufficient. Shellac has been used to insulate the catheter, but it is not easy to apply and is not found very satisfactory. While the hard rubber catheter is best, it has the disadvantage of being more difficult to properly apply to the Eustachian meatus. The set of bougies should consist of three, having tips varying in size from one to two millimeters. The wire should be at least two inches longer than the catheter. It is necessary to know just how much longer the wire is than the catheter so that by measuring the wire extending at the back end of the catheter you may know just how far the bougie has passed into the Eustachian tube. In attaching the cord to the gold wire a spring clip should be used, and the cord should be carried over the top of the patient's head so that the head will carry the weight of the cord, and not permit it to drag down the bougie. With the catheter in good position, the bougie is passed through it into the Eustachian tube until an obstruction is met. Then one to three milli-amperes should be turned on and the tip of the bougie held firmly in contact with the obstruction. Very soon, under ordinary circumstances, the bougie passes the obstruction. This process may be repeated several times before the bougie enters the tympanic cavity. According to reports a number of physicians have used as much as five milli-amperes, but I have noticed that those who have used the stronger current as a rule report adversely as to the results obtained by the use of electricity in the Eustachian tube. My impression after experimenting with a current of five milli-amperes applied to the nasal mucous membrane, where I could watch the result, is that the current is too strong for the size of the electrode, and that a burn results. There is no doubt that when too strong a current is used in the Eustachian tube there will be destruction of tissue and that the scar resulting will contract in time and defeat the very purpose for which the electricity was used.

Usually the patient experiences a slight bubbling sensation in his ears as the electrode passes through the tube. The pain is slight and often is entirely absent. It is well to remember that negative galvanism has no antiseptic properties, and hence the necessity for using great care in the employment of this current in the Eustachian tube and the importance of avoiding inflation of the middle ear for from one to two days afterward.

Treatment of organized Eustachian obstructions has little or no immediate effect upon the condition of the middle ear. By the time the Eustachian tube reaches a condition demanding the use of negative galvanism in its treatment the middle ear is in such a state that measures must be instituted to relieve the pathologic conditions due to Eustachian occlusion. In addition to the treatment of the Eustachian tube, if the inflammation in the middle ear is found to be in the hyper-

trophic stage, positive galvanism is indicated to lessen the blood supply and to stop the formation of connective tissue. Later negative galvanism should be used for its solvent effect, and to bring about the absorption of the connective tissue already formed. If, when the treatment is commenced, the middle ear has reached a period when connective tissue is no longer being formed, negative galvanism should be used for the purposes above stated.

In applying electricity to the middle ear the tip of an ordinary applicator should be covered with cotton, being sure the end is well protected. A piece of delicate rubber tubing, an inch long, should be slipped over the applicator and the outer part of the cotton pencil, leaving from one-fourth to one-half an inch of the cotton exposed. The cotton should then be wet and pushed into the auditory canal until it comes in contact with the drum membrane. The cord should be carried over the patient's head and attached to the applicator by means of a spring clip. The opposite pole may be held in the hand or, what is sometimes better, may be applied to the pharyngeal meatus of the Eustachian tube. In using electricity in this manner great care is necessary not to use a stronger current than the patient can comfortably bear. It must be remembered that the drum membrane is exceedingly sensitive and that the current must be increased gradually. The patient's feelings and not the meter should determine the amount of current. Frequently a fourth of a milli-ampere is all that can be endured. The best results have seemed to come from the moderate current applied for a considerable time. The examination of the ear after such treatment will show the drum membrane and all the visible parts of the middle ear greatly congested. The treatment should be continued daily for a week or two, and then less frequently as long as improvement seems to justify. A guarded prognosis should be made, for it is not possible to replace lost parts nor to fully restore the function when it has been long impaired. A diagnosis of all the conditions present should be carefully made before treatment is undertaken. The question of diagnosis opens up the whole subject of functional examination, which is entirely too extensive for consideration at this time. While it is not the intention to advocate the use of electricity as a panacea in all cases of deafness, nor to use it to the exclusion of other methods, it is true that a large number of otherwise hopeless cases have been improved by this plan of treatment.

DISCUSSION.

Dr. Coleman was the first speaker. He expressed his approval of the scope of the paper, stating it gave the complete synopsis of the physiology and pathology of the middle ear and in addition the *modus operandi* of galvanic treatment for the various pathologic conditions of the entire ear. In the literature on the sub-

ject he had found only discouraging reports from the use of electricity and had supposed that the use of galvanism was practically abandoned. In many of these reports the technique was not described and they were therefore valueless as a guide to the investigator.

Dr. Coleman then spoke of his experience, saying he had used an electrode applied to the external ear with negative results. Dr. Andrews' paper explained this failure. Dr. Coleman's experience was more extensive in the treatment of the eye than of the ear, although he was not without experience in the treatment of the latter organ. He had for some time used the sinusoidal current in optic atrophy and in cases of chronic deafness.

APPLICATION OF THE SINUSOIDAL CURRENT.

Dr. Coleman had used up to recently the Eustachian electrode applied in the mouth of the tube and a small sponge electrode on the ear. He now inserts in both ears moistened cotton wool into the external meatus to the tympanum through a hard rubber ear speculum. The current passes through the head between the two electrodes. He regulates the strength of the current to the tolerance of the patient with a carbon rheostat. The length of the seances is ten minutes; treatment every day when possible.

ILLUSTRATIVE CASE.

Patient, a girl 17; deaf six or eight years. Had been treated by other specialists with negative results. Dr. Coleman then began treatment, using the pneumatic aural massage; treatment continued for a year. Before the treatment the voice could not be heard unless the lips of the speaker were placed close to the ear. As a result of the treatments the distance was lengthened three inches. At this time Dr. Coleman had become interested in the sinusoidal current, and he therefore tried it on this case. In three months the natural tones of the voice could be heard a distance of twelve feet. After a lapse of five years the hearing was not impaired.

The above is a typical case of catarrhal otitis media. He had obtained similar results in several such cases. He did not feel like making any dogmatic statements regarding the relative value of the galvanic and sinusoidal currents, but he felt that much of the electrolytic action attributed to the galvanic current had been demonstrated only on dead tissue and the action might not be so pronounced as on the living body. Something is needed to increase the metabolism. That the sinusoidal will do this is shown in that there has been demonstrated an increase of 25 per cent in the amount of CO_2 exhaled in the breath, while the amount is not increased by the galvanic current. The sinusoidal current obtained from a Victor motor with 12,000 alternations per minute sends considerable cur-

rent through the tissues and the patient can endure it because of the rapidity of the alternations.

Illustrative Cases of Dr. Coleman's.

Patient suffered from optic atrophy; had been treated for one year without improvement by another specialist. Treatment discontinued for six years. It had now become a case of the most pronounced type. The patient was seen by a dozen members of the Ophthalmological Society and a diagnosis was corroborated. (This is especially mentioned, because if such a case is not benefited by electricity the diagnosis is not questioned, but should improvement result grave doubts of the diagnosis are raised. The results are indeed almost always negative, nine out of ten being failures, because electricity is used inadequately.) Before treatments were begun the patient could not uniformly count the fingers when placed before the face. Improvement began early in treatment. The patient was soon able to come to the office unattended. Her eyesight was tested with the Snellen chart, which was placed within a few inches of the face. She was able to gain a line about every three weeks, seeing progressively the smaller type until at the close of the year she could read next to the smallest type on the chart at the above-mentioned distance. Dr. Coleman cannot now report on the present condition of the patient, because she has joined the Christian Science church. But he fears a retrogression has set in, since the optic nerve had not then resumed its normal condition.

Regarding electrodes, Dr. Coleman thought that the common electrode should be as effective as the gold electrode, when used as the negative in treating stenosis of the Eustachian tube.

Dr. Coleman was disappointed in that the paper did not tell the use of the X-ray in treatment of the ear. He knew that Dr. Andrews had been experimenting with this agent. He had read reports on its effect upon the superficial lesions of ulcerating character and wondered whether it might not be of value in lesions of similar character affecting the eye and ear. He is at present experimenting along this line.

Dr. Grubbe said he could not discuss the paper as a specialist, but as an electro-therapeutist. The paper well brought out the polar action of the galvanic current. The positive pole is used to increase the circulation and with the proper electrode causes an anti-septic action, since copper oxychloride is found in the tissue. The negative pole is used for its dissolving effect on hypertrophied tissue. Dr. Coleman used the sinusoidal current only for its functional effect. The speaker would like to have the faradic current tried in such cases. The faradic, when slowly interrupted, produces contraction of the muscles and leads to metabolism in the tissues that might otherwise be in a state bordering on atrophy. The rapid faradic and the static surging produce effects on tissues similar to

those of the sinusoidal; they produce muscular irritation, thus leading to metabolism.

Dr. Burdick stated that he had some experience with the sinusoidal current, but not in Chicago. There is no sinusoidal apparatus, properly so called, in the city. The Victor motor furnishes an alternating current, but not a therapeutic sinusoidal current. Dr. Burdick has seen one in Kennelly exhibit at the World's Fair in 1893. He believed that there are only a few such generators in the country. The apparatus consists of two permanent magnets surrounded with a coil of coarse windings. Between the two magnets there is a mass of soft iron, elliptical in shape, with an axis in the center.

This is caused to revolve and produces a gradual swelling of the current (eight changes of the sine per minute), which is very pleasing to the subject, even though amperage is sent through the muscles to keep them alternately in a state of tetanic contraction and complete relaxation. The magneto by McIntosh does not furnish a therapeutic sinusoidal—the sine changes too many times per minute. Dr. Burdick stated that the alternating is trophic and of value in relieving pain, especially sciatic. Herdman takes the alternating current from the street mains through a water rheostat—i. e., the foot is placed in water. The other electrode is used as labile over the course of the sciatic nerve. Dr. Burdick wanted to call attention to the fact that even in the alternating current there is electrolysis of the electrodes that dip into a salt solution; for example, if two copper electrodes dip into a copper sulphate solution, both electrodes will be "chewed up," one sign predominates. Dr. Coleman is using the plain alternating current and gets plenty of it through the tissues. His encouraging report is evidence of the value of the current. The alterations are rapid. As the motor runs about 1,800 revolutions per minute, the alterations are about 3,600 per minute. In the high frequency apparatus the alterations are as many as one and one-half millions. The therapeutic effects of the high frequency must be still different. This does not produce muscular contractions. It is rather a nerve stimulant.

Mr. Fuchs was called upon to discuss the electric currents. He stated that he had little to add to Dr. Burdick's explanation. He had generated a sinusoidal current by connecting in series the primaries of two induction coils. The second coil has two turns in the primary wound differentially and connected in multiple. By this arrangement the current rises from zero to a maximum and sinks to zero, then instead of sinking below the line as in an alternating current, it again rises to the maximum due to the opposite winding of the second coil.

Dr. Andrews closed the discussion. He favored gold bougies after having experimented with those made of copper, German silver and aluminum. The

copper and aluminum was too soft, not rigid enough. The German silver was better in this respect, but would unfortunately tarnish. The gold did not fail in either of these requirements. Dr. Andrews had used the faradic in certain cases where the patient could not differentiate sounds, but all noises would be confused. The opposite conditions occur when the hearing improves in a multitude of sounds—such cases can hear better near a threshing machine than in a quiet room. Dr. Andrews had used the high tension apparatus on such cases as well as the galvanic current. He had obtained some results. He stated he had not used a sinusoidal and could not therefore report on the comparative value of the two currents. He had experimented with both the static charge and the X-ray. He had no report to make as yet.

X-RAY TREATMENT OF TUBERCULOSIS OF THE INTESTINAL TRACT.

At the last meeting of the Chicago Electro-Medical Society Dr. Burdick reported informally a case of tuberculosis of the bowels treated with X-ray. The case was diagnosed by Dr. Chas. Simons. The urine was loaded with albumen; casts too numerous to count; 5½ per cent ures; diarrhoea, 18 to 25 stools per day. After the first treatment of fifteen minutes an improvement in the urine was noticed. The treatments were continued three times per week for four weeks. At the end of this period there was a bare trace of albumen, a very few casts, urea 2½ per cent, the bowels moved once or twice per day. The treatment was continued for three months. At an alleged personal grievance the patient stopped treatment. At the end of five months the patient died suddenly, cause not known.

BRIGHT'S DISEASE TREATED WITH THE X-RAY.

The patient was a traveling man suffering from Bright's disease; blood casts, pus albumen abundant, urea high; extremities edematous; heart affected. The X-ray light was sent through the bowels and kidneys. After three weeks of treatment the casts had entirely disappeared from the urine, the albumen decreased markedly. The patient returned to his work and has reported no further trouble. Very little is proved by two cases, but they at least point to the fact that nutritional effect of the X-ray is very little understood. The effect is deep as well as local.

ANNOUNCEMENT.

After due consideration we have decided to adopt magazine size for our journal, beginning with the January number of the third volume, and believe that such a change will be welcomed by our numerous readers.

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Editorial Management. The "Era" will be edited by Prof. C. H. Treadwell, formerly instructor in Physics in Syracuse University; besides a corps of eminent medical practitioners, and more especially those engaged in Electro-Therapeutics, will be prominent contributors.

Tube and Archive of X-Ray examinations, Clinical Record and the discussions had upon the theory and practice in all its spheres of applied X-Ray radiography, when concisely and comprehensively stated by letters and designs. Such correspondence is respectfully solicited and will receive special care and attention.

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The Era will cover an extensive and exclusive field for makers and manufacturers of X-Ray appliances and Electric machinery, as the medical practitioners will be their best patrons.

NOTICE.

The regular meeting of the Chicago Electro Medical Society will be held on Tuesday, Dec. 30, 8 p. m., room 301 Schiller Building. A paper on the "Cathode Rays" will be read by Mr. Treadwell.

MINUTES OF THE CHICAGO ELECTRO-MEDICAL SOCIETY.

The regular November meeting was held in the Schiller Building on Tuesday, Nov. 25, with Dr. Burdick in the chair.

Minutes read.

The name of Dr. A. R. March had been omitted

from the list of elected members of preceding meeting. Minutes approved as corrected.

Under the order of unfinished business Dr. Burdick reported that a temporary injunction against the other society of the same name was not granted. The matter will not be settled until the hearing upon the permanent injunction. Dr. Andrews, then read a paper on the use of the galvanic current in the treatment of diseases of the middle ear. The paper was discussed by Dr. Coleman, Dr. Grubbe, Dr. Burdick and Mr. Fuchs.

The society then adjourned.

EDITORIAL ANNOUNCEMENT.

In our present issue we publish in full the original articles of John B. Murphy, M. D., Chicago, and Russell H. Boggs, M. D., Pittsburg, Pa., as read before the meeting of the American Roentgen Ray Society held at the Sherman House on Dec. 10 and 11. Other original articles, together with discussions by prominent X-ray workers, which were read at the meeting, will be printed in our next issue.

PROGRAM OF THE AMERICAN ROENTGEN RAY SOCIETY.

WEDNESDAY, DECEMBER 10.
 Morning Session, 9.30 o'clock.

General business.

Reading of essays.

1. X-Ray Physics, T. Proctor Hall, M. D., Chicago, Ill.
2. Equal Potential Surfaces in X-Ray Field, Jno. C. Pitkin, M. D., Buffalo, N. Y.
3. Instantaneous Skiography, Mihran K. Kassabian, M. D., Philadelphia, Pa.

WEDNESDAY, DECEMBER 10.
 Afternoon Session, 2.30 o'clock.

President's annual address.

4. (a) Systematic Records, (b) The Routine Use of the X-Rays, M. J. Wilbert, Philadelphia.
5. Skiography as an Art, J. Rudis-Jicinsky, M. D., Cedar Rapids, Iowa.
6. Results and Technique in Treating Epithelioma with X-Rays, Emil H. Grubbe, Chicago.

WEDNESDAY, DECEMBER 10.
 Evening Session, 8 o'clock.

7. The Roentgen Ray as a Therapeutic Force, from a Clinical Standpoint, with Illustrative Cases, John B. Murphy, M. D., Chicago, Ill.

8. Treatment of Three Cases of Cancer, One Case of Tuberculosis and Seven Cases of Rodent Ulcer and Lupus, G. P. Girdwood, M. D., Montreal, Canada.

9. The Technique of Treatment of Malignant Growths, J. N. Scott, M. D., Kansas City, Mo.

THURSDAY, DECEMBER 11.
Morning Session, 9.30 o'clock.

General business.

- 10. Radio-Therapy in Pulmonary Tuberculosis, Gordon G. Burdick, M. D., Chicago, Ill.
- 11. X-Ray Treatment in Intra-Abdominal and Other Deeply Located Malignant Growths, Clarence E. Skinner, M. D., New Haven, Conn.
- 12. Diagnosis of Calculi by X-Rays. Russell H. Boggs, M. D., Pittsburg, Pa.

THURSDAY, DECEMBER 11.
Afternoon Session, 2.30 o'clock.

- 13. The Technique of X-Ray Therapy, H. Preston Pratt, M. D., Chicago, Ill.
- 14. Result of Treatment of Guinea Pigs Affected with Tuberculosis by High Frequency Currents, G. P. Girdwood, M. D., and C. Higgins, D. V. S.

The new officers are:

President—Prof. Goodspeed of the University of Pennsylvania.

Vice-Presidents—John B. Murphy, M. D., of Chicago; Wm. Jordan Taylor, M. D., of Cincinnati, Ohio.

Secretary—James B. Bullitt, M. D., of Louisville, Ky.

Treasurer—Weston A. Price, D. D. S., of Cleveland, Ohio.

Chairman of Executive Committee—James P. Marsh, M. D., of Troy, N. Y.

Members of Executive Committee—Ralph R. Campbell of Chicago, Walter W. Johnson of Rochester, N. Y.

NOTES.

The meetings were largely attended. The papers were for the most part interesting and practical. The meeting brought together many of the most prominent radiographers and radiotherapists of both this country and Canada. The discussions in many instances were of the highest scientific value. While encouraging reports of the value of the X-ray in various lesions were given, many protests were made against the reckless employment of the rays to the exclusion of the other established methods of treatment. In cases of cancer of all varieties many operators favored surgical intervention first, to be followed by the X-ray essay prophylactic.

The discussions on the technique of the skiagraph were satisfactory. Exhibitions of the work done showed that the ray furnishes undeniable evidence of the presence of calculi, whether located in the gall bladder, kidney, ureters or bladder. At the same time, the danger of "seeing everything in the picture" was pointed out.

The manufacturers' exhibit of coils, static machines and tubes was very interesting. Among the firms were W. Scheidel & Co., Western X-Ray and Coil Co., C. F. Birtman & Co., Nelson & Co., Waite & Bartlett, Betz & Co., R. Friedlander & Co., R. V. Wagner & Co., American X-Ray Co., German Medical Electric Co. and Queen & Co.

Membership in the society is no longer easily secured. The executive committee is careful to look up the ethical and scientific standing of all the applicants. Fully eighty members were taken in, among them being the prominent members of the local committee of arrangements, who had not before joined the society. The scientific standing of the society is now assured.

The society has no official organ. One journal had claimed this honor in the past, but without authority. The full proceedings will doubtless be published in pamphlet form. Members were given permission to contribute their papers to any X-ray or medical journal.

A REPLY FROM W. J. MORTON, M. D.

To the Editor of the American Electro-Therapeutic and X-Ray Era:—

"In the report of a discussion upon the X-ray treatment of cancer, appearing in your esteemed journal of October last, I find the following statement, said to have been made by one of the gentlemen who took part in the discussion: "The static breeze pumps the infection into the system. He lost several cases until he discovered this error. Morton, Skinner and Snow have buried patients due to this mistake." So far as I am concerned, I beg you will allow me to state that I have never yet treated cases of cancer by the static breeze or spray, and have never therefore had the sad experience referred to. On one occasion, it is true, I used the static breeze for four treatments in a difficult case, but seeing no particular results abandoned it. I hasten to state that the patient remains in good health. I fail to see, however, that there would be anything reprehensible in treating cases of cancer with the static breeze, and should not hesitate to do so, were it not that I believe that the X-ray is entirely worthy of confidence, and that it is not at present wise to combine two forms of treatment."

Yours very truly,

WILLIAM J. MORTON.

19 East 28th street, New York City.

Comment: We believe that the marked improvement in cases of epithelioma treated with the static breeze as an adjunct to the X-ray successfully disproves the "pumping of infection into the system" by the static breeze. No definite case has been reported of this spread of infection by the breeze. Most operators who do not use the breeze prefer, as Dr. Morton does, to use only one form of treatment.

X-RAY DIAGNOSIS OF CALCULI.
 RUSSELL H. BOGGS, M. D., PITTSBURGH, PA.
 (With three half-tone illustrations.)

The detection of calculi in the kidneys, ureters and bladder is one of the most useful applications of the X-rays. After a careful examination of these organs, if no calculi are found, a negative diagnosis is valuable, relieving the surgeon of advising, and the patient of submitting, to an unnecessary operation. In order for the radiographer to be able to give a decided opinion it is necessary that his technique should be perfect. Faulty technique is the cause of failure in this as well as in all other radiographic work. An inexperienced operator should not begin with this class of X-ray work any more than the surgeon just beginning to operate should begin with a laparotomy. He should start with lighter work and be able to photograph every part of the body before he attempts making a radiograph of a calculus. The members of this society have no doubt heard of calculi having been located by the fluoroscope, but even if this is possible such a means of diagnosis is not reliable. All cases of suspected calculi of the kidneys, ureters or bladder should be radiographed, as radiography is the only means by which calculi can be diagnosed. A large number of kidney calculi produce only a dull pain in the lumbar region, a slight change in the urine and other obscure symptoms, which could be caused by a floating kidney, chronic nephritis, lumbago or other diseases. The large calculi frequently produce less severe symptoms than the smaller ones, due, no doubt, to their immobility.

A stone in the ureter may simulate appendicitis, ovaritis, salpingitis or cystitis. As a calculus in the urinary tract often causes a variety of symptoms, surgeons have long realized that they have needed some more accurate means of diagnosis. Then when the symptoms of calculi are present the radiographer will not only confirm the diagnosis, but will show the number, size and exact location of the calculi. Therefore, the surgeon is greatly aided by being able to decide which operation is suited to each particular case. He can then perform his operation with the least possible injury to the surrounding tissues. Without an X-ray examination the wrong kidney may be explored; such cases have been known. It is no longer necessary to perform an exploratory operation on the kidney when the surgeon has such means at hand. At the present time the only calculi in the kidneys or bladder which cannot be relied upon to give sufficient density to the radiograph are minute particles of uric acid, and fortunately these are rare, except in children, in whom the diagnosis is not difficult.

So far many cases of gallstone have not been successfully radiographed, partly on account of the gall bladder's being covered by the liver, partly because

of its motion during respiration, and partly on account of the composition of the calculi. When the gallstones contain sufficient mineral matter—namely, the calcium and magnesium phosphates, they can be located by the rays. When radiographing the gall bladder the operator must have an apparatus which will carry a large amperage for a short time, but when examining for stone in the kidneys, ureter or bladder a less amperage and longer exposure will answer, as these parts can be kept comparatively quiet. However, the apparatus must be of the very best and the tube one which is self-regulating and gives a uniform light. Some of the tubes contain so much metal besides the platinum that when excited by a powerful current this metal becomes heated and gives off a vapor to such a degree that the vacuum keeps reducing until we have not sufficient penetration toward the end of the exposure. With such a tube you are compelled to begin the exposure with a higher vacuum than you otherwise would, to have penetration during the entire exposure. Almost every operator has a different method by which he gets fairly good results, but as differentiation is the main point, the vacuum should be as low as will secure sufficient penetration to make the radiograph in a reasonable length of time.

The preparation of a patient for examination is very essential. His bowels should be empty; he should not have taken any food or water for at least twelve hours. The patient is placed on the table, on his back, with the plate under him. The plate should be large enough to extend from the tenth dorsal vertebra to the crest of the ilium. The tube is placed almost in the median line over the second or third lumbar vertebra. The time of exposure ranging from two to eight minutes, depends on the size of the patient. If the patient is very large and there is too much abdominal breathing, it is well to bandage the abdomen tightly, and even sometimes fasten this bandage to the table to prevent the patient from moving.

In examining for vesical calculi the bladder should be empty as well as the bowels. As the plate should be as near the calculus as possible, it is desirable to make two radiographs, one with the patient lying on his back and one with him lying on his face; exposure from one to five minutes.

In examining for biliary calculi the patient should be prepared as before stated and lie on his face, but more to the right side with plate under him. For this work in the future I intend to use a Wehnelt interrupter and a very heavy current, thus requiring a very short exposure. I have taken a chest of a man weighing 185 pounds in twenty seconds, showing all detail in the thorax and the region of the liver. The greatest difficulty is to get a tube to stand such a current, as one exposure renders the tube useless until the proper vacuum is restored. At present I have a special tube of extraordinary size, which I believe

will carry the current for sufficient length of time without destroying the vacuum. I hope to be able to give a full report in the near future.

The plates must be especially prepared for X-ray work and not put in the envelopes until ready for use, as paper absorbs moisture, thus lessening the sensitive surface. Any good developer can be used; the one given by the maker of the plates is usually recommended. The operator who keeps continually changing from one developer to another can never expect to become familiar with any one solution. The best developer is the one that is best understood by the operator.

The correct interpretation of the developed plate, without which the previous work is useless, requires an extended experience and close study. This study should be of the plate and not of the print. The plate should be studied in all its conditions and under both artificial light and sunlight.

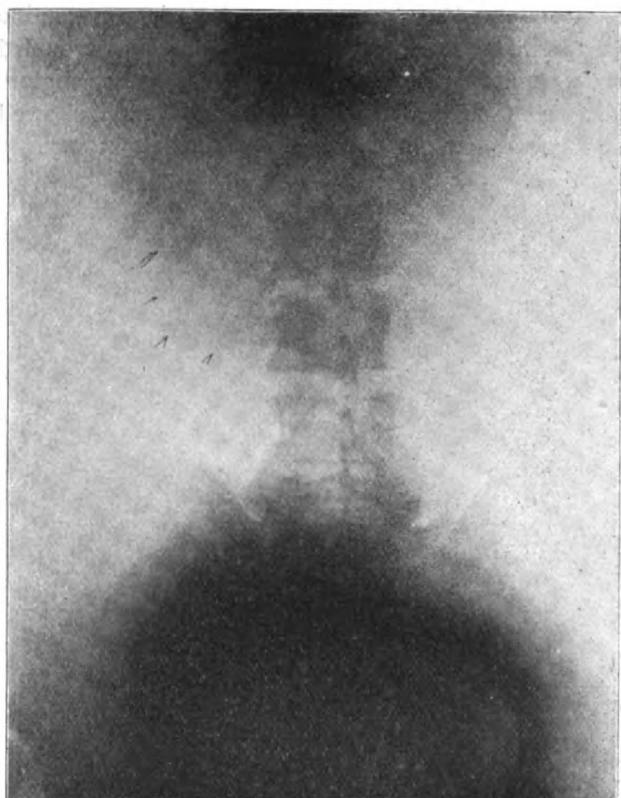
A radiograph that is nearly enough perfect to show a calculus in the kidney or ureter must show besides the articulations and processes of the vertebræ, the outlines of the last two ribs. For vesical calculi the plate must be clear and show plainly the articulations of the pelvis. In examining for gallstones the plates should be clear and show the ribs and vertebrae, but not too plainly, as in order to secure the best outline of the bones too much of the soft tissues which do not contain so much density are lost. When a plate possesses differentiation enough to show tissue of less density than a calculus, such as the psoas muscle, no stone could escape detection.

Case 1.—Mr. B., referred by Dr. Victor King for an examination, had been suffering with renal colic at intervals for fourteen years. At times it would take three or four hypodermics of morphia to relieve his pain, and for a month previous to this examination he had been unable to work. His urine was heavily charged with mucus and uric acid. During the afternoon in which this patient was radiographed the first time, he had been drinking a great deal of water, and it was with some difficulty that the calculi were found. He came the next day prepared as before stated for examination, and the radiograph showed clearly two calculi surrounded by a pus sac. Dr. King operated a few days later and found the two urinary calculi and the pus sac, thus verifying the radiographs.

Case 2.—Mr. B., referred by Dr. McKenna, with the following symptoms: Vesical irritation, frequent and painful micturition. Some days he would be compelled to urinate every hour, and complained particularly of a dull ache afterward. This patient had a calculus removed from the bladder eleven years ago, and it was a question whether the scar tissues had become inflamed or a new calculus had formed. Two radiographs of the bladder, one taken in the dorsal position and the other with the patient lying on his

face with the plate under him, showed no calculus. Other radiographs taken of the right kidney and ureter showed five small stones in the kidney.

Case 3.—Mr. B., a commission merchant, had been suffering with a dull pain in the lumbar region for a



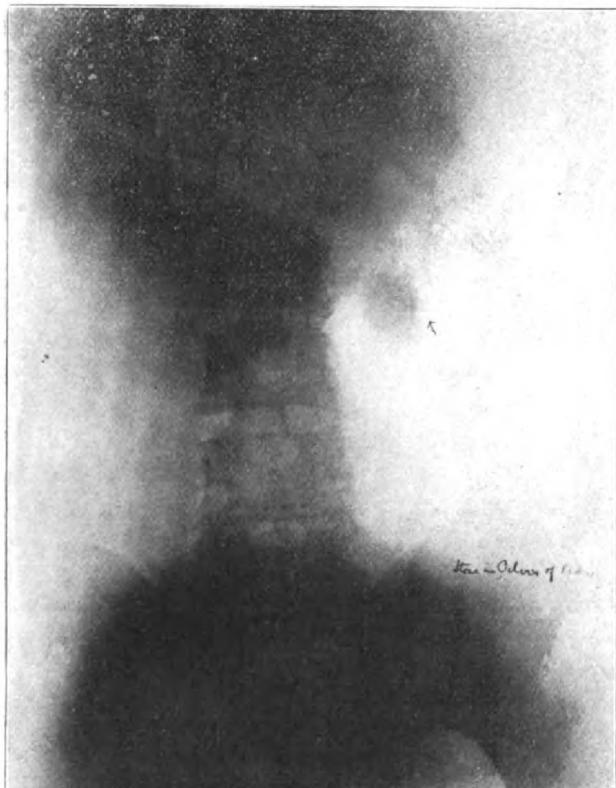
CASE 2.

period of twelve years. He had been to many physicians. The greater number of these diagnosed his trouble as intercostal neuralgia, and several pronounced it chronic Bright's disease, as his urine contained a small amount of albumen. Mr. B. stated that he was always better in warm weather, but that he had the dull ache in the lumbar region all winter. A radiograph showed a stone the size of a hickory nut in the right kidney.

Case 4.—Mr. D., an athlete, had been suffering with severe pain in the region of the left kidney for more than fifteen years. It started when he was attending school. At first the attacks occurred about every six months, but later they became more frequent, and lately he had attacks as often as every two weeks. This patient had been to physicians all over the United States, and even had an X-ray examination at one of the large hospitals, but no calculi were found. He said his case had been diagnosed as floating kidney, intercostal neuralgia, lumbago, etc., and even had his ureters catheterized. His attacks were not brought on in the usual way—i. e., by the jarring of trains, street cars or violent exercises, such as playing football. The radiograph showed a calculus in the left kidney.

Dr. Martin, who referred this case, was the first physician that made a diagnosis of a kidney stone.

Case 5.—Mr. E., referred by Dr. Ferree, had been suffering with renal colic at intervals nearly all his life. Twenty years ago he passed a calculus about the size and shape of a beech nut, after which he was free from attacks for eight years. Then the next nine years he has had no severe attacks, but was troubled almost continually with a pain in the lumbar region, which simulated lumbago. The radiograph showed one large and two small calculi in the left kidney.



CASE 3.

Case 6.—This patient had been suffering six months from vesical irritation. Complained of frequent and painful micturition. He was sounded for stone and a diagnosis of cystitis was given. His bladder was washed out with little or no benefit. The radiograph revealed several small calculi in the bladder.

Case 7.—Mr. C. was referred for X-ray examination because his symptoms indicated both stone in the ureter and appendicitis. The radiograph showed no stone and an operation proved the case to be appendicitis.

Case 8.—Mr. B., an engineer, was suffering from a severe pain in the region of the right kidney. A radiograph showed no stone present. The pain was relieved by a few treatments of brush discharge from a static machine.

Case 9.—A physician was referred by Dr. Stewart for X-ray examination. He was healthy until

1892, when he had grippe. Not regaining his strength, he went to New Mexico, and while there he had his first attack of renal colic. Since then he has had an attack on an average of every two months; generally lasting from ten days to two weeks. Urine was normal. Two radiographs showed a stone to the left of the lumbar vertebræ, and from the shadow cast by the stone it is likely composed of urates.

Case 10.—Mr. C. S. Z. was referred by Dr. Ferree to verify his diagnosis of calculi. The radiograph showed a large calculus about the size of a walnut in



CASE 10.

the bladder. The doctor operated the next day, finding the calculus to be of the size and shape shown by the radiograph.

Case 11.—Referred by Dr. McCready of Alleghany, with the following note: Kindly examine Mrs. S., age thirty-eight, for gallstones. She has been under my care for five months with repeated attacks of colic. Her attacks come on suddenly, they are extremely severe and are only controlled with large doses of morphia hypodermically. She has averaged an attack every ten days for the past five months. She has searched incessantly for gallstones, but as yet she has never found any stones in her passages. Radiograph showed a collection of stones in the gall bladder. One week after making the radiograph I received a telephone message from Dr. McCready saying that Mrs. S. had just found four small gallstones in one passage, and that they have the appearance of having been agglutinated; likely these were the first she has evacuated.

The next three cases have been previously reported in an article published in the "Journal of Advanced Therapeutics" of October, 1902.

Case 12.—Mr. B., a roller, large, powerful and well nourished, had suffered with a pain in the right side below the arch of the last rib for ten years; at times he was compelled to take large doses of morphine and was unable to work for many days. His pain was

always increased when riding on trains or street cars, and from other symptoms it was a question of making a diagnosis of renal calculi or floating kidney. He had been to a number of physicians, two of whom had pronounced his case renal calculi. A Roentgen ray photograph showed a stone in the pelvis of the kidney.

Case 13.—Mrs. D., age 35, had suffered for years with a floating kidney, which had been diagnosed by ten or more physicians. From her symptoms several of the physicians suspected a tubercular kidney as well. A radiograph showed a stone in the kidney. Her physician, Dr. Huggins of Pittsburg, who referred this case and the previous one to me, operated and successfully removed the calculi in both cases, thus verifying the radiographs.

Case 14.—Referred by his family physician, Dr. McCready, with the following history: Mr. H., a painter, had repeated attacks of colic. The last time commenced with lead colic, having characteristic symptoms, blue lines on the gums and obstinate constipation. After the usual treatment he was relieved and was about to return to work when he was seized with another very severe attack, which simulated biliary colic. The blue lines on his gums had disappeared and his physicians felt certain that the trouble was due to gallstones. Every stool was examined for a period of four weeks, but no stones were found. A radiograph showed stones in the gall bladder.

DISCUSSION ON DR. BOGGS' PAPER.

Dr. J. Rudis-Jicinsky of Cedar Rapids, Iowa, finds that the use of a plate large enough to cover not only the region of the kidney, but the ureter as well, is a great aid in this work. Errors may be avoided in this way, especially if the work is being done by one who is not an expert. A case in point was cited. No stone was seen in the kidney, but the operator found it in the ureter. He has found examination of the plate for spots and other defects very useful, as these might be mistaken for a stone. He has also found that gallstones containing cholestrin do not show very well, often not at all. This is exceedingly liable to lead to errors and should be taken into account.

Mr. W. C. Fuchs of Chicago said that to make a good radiograph three things are necessary—a good plate, a good tube and a good apparatus. From four to five minutes are required to make a good radiograph of the kidney. He uses a static machine having 28 plates, which gives an electrical discharge about as thick as the wrist. It gives a perfect radiograph, showing all the details, in about six minutes. The hardest stones to find are the small stones. He uses two plates with an envelope around them, and if there is any defect in either plate it will not show in the same place on both plates. He does not believe that there is a plate made which is sensitive enough to

take an instantaneous exposure of a gallstone. Furthermore, these exposures must be developed to such a degree that spots are produced on the plate, and it is impossible to tell whether they are a stone or a defect in the plate. In radiographing for renal calculi it is possible to mistake a tubercular mesenteric lymph gland for a calculus. A case of this kind was referred to. He prefers to take two pictures, one a time exposure and the other for as long a time as the patient can hold his breath, about thirty seconds. The sensitiveness of the plate is added to if another plate with an emulsion on it is placed next to the exposed plate. He is of the opinion that if we had a machine for the different parts of the body the work would be improved upon. A static machine with about fifty revolving plates is the machine of the future. For radiographs of the brain the coil and a very high vacuum tube should be used. The same is true of the chest of tubercular patients. The machine is the important part of the outfit.

Dr. Boggs, in closing, advised that it is preferable to verify the findings of the first plate by a second. This will avoid mistaking one thing for another, as mentioned by Dr. Jicinsky and Mr. Fuchs.

X-RAY IN THE TREATMENT OF CANCER AND OTHER MALIGNANT DISEASES.

By Emil H. Grnbbe, B. S. M. D., of Chicago, Ill.

The following article was published in the New York Medical Record of Nov. 1, 1902. We abstract in part and print in full other parts of the article.

The writer calls this a preliminary report, but guards against the charge of hasty conclusion by calling attention to the fact that his cases are largely post-operative. Altogether too many reports have been given based on a few isolated cases, indefinitely stated, with poor histories.

ACTION OF THE X-RAYS.

"Many theories have been advanced as to the action of the X-ray in the various conditions for which it has been used. By some the belief is held that restitution of the tissues takes place under X-ray treatment; that is, cancer tissue becomes transformed or is developed into normal tissue. Others, taking for granted that the parasitic or bacterial theories of the origin of some of the diseases treated by the X-ray have been conclusively proven, believe that the X-ray, due to its actinic action, destroys these conditions. These theories seem rather far fetched, however, for, aside from the lack of proof of the parasitic or bacterial origin of the diseases referred to, it does not seem probable, from observations which have been made by various investigators, that the success of the X-ray treatment in these diseases is exclusively due to any bactericidal power which the rays may possess.

"Personally, we believe the action of the X-ray is the same in all the diseases in which it has been found of value, and also that that action is most plausibly explained when viewed from the standpoint of the theory of phagocytosis followed by leucocytolysis.

"First, it must be admitted that, aside from whatever chemical or electric property the X-ray may possess, the sum total of its action is that of an irritant. Now if we irritate a certain part of the body by making frequent X-ray exposures, we produce ultimately a simple focal inflammation. Inflammation means the determination of much blood to the part, hyperæmia. Due to the increased volume of blood, leucocytes accumulate in large quantities and, finally, stasis occurs, the circulation being cut off, the part dies for want of nourishment. When no suitable nutritive material is at hand there is developed a tendency toward degeneration. No doubt this degeneration is partly, at least, due to an accumulation of the products of the metabolism of cells.

"Primarily, then, the X-ray affects the essential tissue-forming elements of the body. Parts which are walled off decompose chemically and are either discharged or absorbed. The rapid decrease in the size of some growths under X-ray treatment also points to a more general or systemic action, probably due to stimulation of the lymphatics.

"The fact that nearly every case, no matter how severe, treated by the X-ray seems to improve at the beginning of the treatment, shows that it exerts an influence which is not only local, but also systemic. From our personal observations upon several hundred patients we have come to the conclusion that the nutrition of the entire system is affected, through reflex action probably, and this produces a general stimulating and tonic effect. As to the special characteristics of the X-ray in different conditions, our experience teaches that the vitality of all patients is increased. It is surprising how long life may be maintained in some cases. Relief from pain is found in the majority of cases, although if a neuritis is coexistent with cancer, especially in breast cases, very little can be done for the relief of the pain."

Dr. Grubbe makes the following classification of lesions in the order of their relative yielding to X-ray treatment: Lupus, epithelioma nodular returns (post-operative), primary breast cases, tuberculosis of the lungs, tuberculosis of the bones, cancers of soft internal organs, sarcomas, osteosarcomas. It is not claimed that all the above lesions have been positively cured.

Regarding the limits of its usefulness, the following is given:

"It is not recommended that the X-ray take the place of the knife in primary or operable malignant growths, but the results so far obtained by X-ray treatment following operation are certainly sufficient to warrant the

careful consideration of the profession. In general, the results of X-ray treatment speak for themselves, and it is unnecessary to present here any argument concerning the practicability of the use of this agent. Enough has already appeared upon this in medical literature.

"It may be well, however, to point out that the whole matter resolves itself into the question of a proper understanding of X-ray phenomena. It is the correct use of this agent for special conditions, with ability to vary its power when necessary, that is essential for obtaining proper results, and not its use in the haphazard manner which is so common to-day, when, through ignorance of its virtues, the X-ray, which is hailed as a triumph by the physician in his struggle against tuberculous and cancerous conditions, becomes a dangerous force in the hands of the incompetent operator. We must not forget that we have a great variety of X-rays to deal with—in fact, to use a comparison, the variation in quantity and quality of X-rays obtainable with one piece of apparatus is much greater than all the varieties and qualities of tones which may be produced upon the keyboard of a piano. Again, different tissues demand different degrees of X-ray value.

"When we understand these facts we can readily see why the treatment of an epithelioma must be different from the treatment of lupus. Ignorance of these facts probably accounts for much of the difference of opinion which exists to-day regarding the therapeutic value of the X-ray."

THE X-RAY BURN.

"The continued administration of the X-ray in any one locality produces, at first, through its irritating influence, a dermatitis. If the treatments are unduly continued ulceration of the tissues may occur, but an X-ray 'burn' need never be considered serious. This statement is made because of the many bold announcements which have appeared concerning the 'dangers of burning under X-ray exposure.' Relatively, the inflammatory reaction, or dermatitis, produced by the X-ray is harmless, and, in most cases, if the parts were not meddled with by the application of strong chemicals, especially carbolic acid in some form or other (which, of itself, may cause gangrene), nature would assert her power and make repairs. We believe we have 'burned' every patient treated, and several of them have been 'burned' repeatedly. Concerning the development of the dermatitis, we find that susceptibility varies considerably. Certain individuals develop a decided reaction after the first treatment, whereas others resist the action of the rays to such a degree that it is only after from one to two months of daily treatment that we are able to develop a reaction. In one case daily treatments have been given for over two years, and, although the tube has been placed very

near the body, nothing more than a slight redness has developed. It is evident from this that an idiosyncracy must exist.

"To prevent the action of the rays upon surrounding tissues a special lead-foil mask is used, which resists the passage of rays to healthy parts. Another precaution might be recommended in order that the 'burning' stage may be retarded—it is the application of plain vaselin to the parts exposed directly to the rays. This substance retards the superficial irritation very much and is especially useful when treating the deeper tissues, and when there is no open ulcer. In all open or broken-down conditions a dermatitis should be rapidly produced."

ILLUSTRATIVE CASES.

"Case 1.—Mrs. M., aged forty years, recurrent carcinoma of right breast. Radically operated upon first time in August, 1900. Recurrence immediately, followed by second operation. Six months after second operation nodules again began to appear in scar tissue, and third operation was performed. After this the nodules remained away for nearly one year, but finally they appeared again, and the patient undertook X-ray treatment. The whole scarred area was filled with a large number of small nodules, each about the size of a pea, which extended even into the axilla. Under X-ray treatment these nodules gradually began to fade away. The patient's appetite improved, pains disappeared, and she felt stronger and was visibly improved in general health, so much so that her friends constantly inform her of her improvement. In this case the treatment was not taken as regularly as recommended. Sittings were given daily for about one month, and on alternate days for nearly four months. Although we do not consider this patient absolutely cured, she certainly shows so much improvement that we think we are justified in calling this a symptomatic or clinical cure.

"Case 2.—Mrs. L., aged forty-eight years, case of scirrhous cancer of right breast. Three years ago last January a small, hard tumor was noticed, which was painful to the touch. Her physician suspected a malignant condition on account of the family history, and an operation was performed, the breast being moved. Last August three nodules began to develop simultaneously in the operation scars. These nodules grew quite rapidly, and since another operation was refused, patient was recommended by her surgeon to try X-ray treatment, which was accordingly begun on September 5 last. Treatment was given daily until November 15, when decided dermatitis developed. The patient was allowed to rest until December 5, when treatments were begun once more and continued daily until January 20, at which time all three of the nodules had entirely disappeared. This case also presented a condition of keloid, which extended over an area of six

inches, and which also was very markedly affected by the X-ray exposures.

"Case 3.—Mrs. O., aged fifty-six years, cancer left breast—so diagnosed by several prominent physicians who had treated her. The original growth presented an ulcerated surface measuring seven by five and one-half by two inches. Several severe hemorrhages had taken place and patient was very weak. Discharge foul and very profuse. Glands in axilla swollen and very tender. Pain in growth and surrounding parts constant and, at times, excruciating. Many methods of treatment had been tried during a period of nearly three years, but were found to be of no value, the condition gradually getting worse. Finally X-ray treatment was advised and undertaken. Treatment given every other day for twenty minutes. No improvement or effect was noticed, other than relief from pain, until after the third week of treatment, when decided dermatitis had developed and pains again returned, due to dermatitis. Treatment, however, was continued every other day, tube being placed farther away from affected area, and in about two weeks more a marked change was noticeable. The hollow cavity of the growth seemed to fill in, the edges of the ulcer began to approach one another, and in three months from the beginning of the treatment the wound had healed over entirely and the patient presented the appearance of having been born with only one breast, so slight was the scar. This patient has been under observation for nearly one year, and during this time no recurrence has been noticed. Patient is a very active woman and travels extensively.

"Case 4.—Mrs. A., aged sixty-five years, case of lupus involving entire forehead, left temporal region, left cheek and eye, and extending to the middle of the left side of the nose. The most extensive lupus formation we have ever seen. Primary lesion a pimple, which developed on left cheek bone over fifteen years ago, constantly grew larger until thirteen years ago medical aid was sought. Various local preparations were tried without avail. Lupus area became constantly larger, even though patient has been practically under treatment of some kind or other for the past thirteen years. Two years ago plaster treatment was resorted to without any beneficial result, and since then the growth discharged constantly and itched intensely, and patient became very weak, due to constant irritation. X-ray treatment began December 2, 1901, and continued every day until January 10, 1902, at which time the looked-for dermatitis had developed over the entire area, and the patient was allowed to rest from treatment. Three weeks elapsed before the irritation had run its course, and, at that time, all parts were covered with new and healthy skin. A month later the hair again began growing on head, eyebrows and eyelashes, and not a vestige of the old trouble can be found.

"Case 5.—Mr. P., aged fifty-five years, lupus on left cheek, surface size of twenty-five-cent piece. Ten years ago patient noticed small festering pimple on cheek, which was opened by scratching with the finger nail. This has never healed over, in spite of the fact that he has been constantly under treatment and tried, among other things, the actual cautery three times, excision once and plaster treatment five times. Patient was sent to us by his son, a physician, and X-ray treatment recommended. Treatment given daily for seven weeks, at which time considerable dermatitis had developed, and patient was allowed to go home and instructed to return as soon as the irritation, due to the treatment, had subsided. The dermatitis did not subside for nearly three weeks, when patient appeared, and we found a small area in the center of the old formation which needed treatment. Accordingly, treatments were again given daily for two weeks, when dermatitis once more developed and patient was again allowed to rest from treatment. On returning two weeks later we were unable to find any trace of the previous trouble, and since that time, now nearly six months, we have seen and examined this patient several times and have been unable to find any return of the lupus.

"Case 6.—Mrs. F., aged fifty years, large scirrhouous on left breast of three years' standing. Had injection treatment without any favorable effect. Would not undergo surgical treatment because she had heard of many recurrences following operation. X-ray treatment undertaken April 15, 1901, daily for first two months, after which decided dermatitis developed, and the breast began to break down and discharged not only a large quantity of fluid, but also much solid cancer tissue. This breaking-down process continued for over one month, when the parts began to heal. The growth seemed to have been entirely enucleated. Treatments were now given every other day, and in the course of two months or more the wound had entirely healed, and, indeed, without much scarring. This patient has been examined frequently and no return detected.

"Case 7.—Mrs. E., aged fifty-two years. Early in the year 1900 the patient complained of pain in the pelvic region. On consulting several physicians the diagnosis of cancer of the uterus was made and operation was recommended. Operation for removal of entire uterus was performed March, 1900. Following this operation a persistent discharge was noticed. The patient took a severe cold in the month of December, 1900, and symptoms of congestion appeared in the pelvic region, followed by the development of an abscess, which broke and discharged through the vagina. Discharge continued offensive, with occasional very profuse hemorrhages. A second operation was recommended and performed by a prominent surgeon in May, 1901. On making an incision the surgeon found that the cancer had returned and was so extensive in

character that he decided not to remove anything. The wound was closed and the husband was told that nothing could be done to save his wife's life, and that she would probably die within a month. During the last week of May, 1901, patient was brought to Chicago and X-ray treatment was undertaken. Daily treatments of ten minutes' duration were given, and at the end of two months the patient had gained twenty-two pounds, was free from pain and the foul discharge had almost entirely ceased. At the end of three months she was discharged symptomatically cured, and she remains so to this writing. During the past eleven months she has gained thirty-five pounds, and writes, 'I continue to keep well; have not felt so well in years.'

"We have a number of other patients who have taken X-ray treatment and who have remained free from recurrence for periods ranging from six months to a year and a half. Many other cases could be cited, but time and space forbid."

CONCLUSIONS.

1. The X-ray is the most remarkable therapeutic agent of the last decade.
2. In properly selected cases of so-called "incurable conditions" the X-ray has brought about remarkable results.
3. Relief from pain is one of the most prominent features of the treatment.
4. Retrogressive changes are noticed in all primary cancer or tuberculous growths.
5. The X-ray has a pronounced effect upon internal cancers.
6. The greatest value of the X-ray is obtained in treating post-operative cases to prevent recurrences.
7. The proportion of clinical cures by this treatment is greater than that obtainable by any other method of treatment.
8. We are positively justified in assuming an idiosyncrasy to X-rays.
9. The peculiarities of each case must be studied in order to get the best results—i. e., no strict rules for treatment can be laid down.
10. Dermatitis, if properly produced, is within certain limits a desirable feature of X-ray treatment.
11. Since the vacuum of an ordinary X-ray tube changes constantly, such tubes are useless for radio-therapeutic work, and only tubes which allow of perfect control of vacuum should be used.
12. The X-ray has a selective influence upon cells of the body; abnormal cells being affected more readily than the normal.
13. Hemorrhages and discharges are decidedly lessened and, ultimately, cease in the majority of cases.
14. Even in the hopeless, inoperable cases the X-ray prolongs life, makes the patient comfortable and the last hours free from pain."

THE X-RAY IN CANCER.

Report of four cases published in the Medical Herald by Dr. W. J. Bell:

The first person to come under my care for treatment by the x-ray was Mrs. A., 39 years of age. No unusual element in family or personal history was elicited. She sought my counsel early in May of the present year for the removal of what she and her medical attendant had concluded was uterine polypi. She gave a record of almost continuous hemorrhage from the uterus for two years past, for which difficulty she had been almost constantly under treatment. Her extreme pallor, great weakness and progressive emaciation accompanied by an odor so disagreeable as to make it impossible for her to remain in the company of others, aroused suspicions that were quickly confirmed upon examination. The entire cervix and much of the body of the womb was destroyed, and an extended surface of grape-like excrescences, readily broken down by even the most careful manipulation, accounted for the continued hemorrhage. The patient was so weak that she could not walk more than a block and a half without giving out completely. With such an outlook, with no promise save to do the best I knew she began treatment. A tube of medium density at a distance of nine inches from the diseased tissues excited by a Fessenden coil was used for treatment, the duration of exposures was twelve minutes daily the first three applications, after this the time ranging from seven to twelve minutes each exposure. By the time the third treatment had been given there was cessation of pain, odor and discharge in a most marked degree, and complete cessation of these manifestations in less than ten days. Treatment was persisted in for four weeks, when the patient was so much improved that she was permitted to go to her home for a week. In a little over a week she returned, having improved in every way. Treatment was again taken up for nine days when she was a second time permitted to go home for over three weeks. At this writing she is under treatment, and expresses herself as feeling well and able to walk five miles if necessary. There is an entire absence of any of the symptoms indicating active malignant disease. She will be permitted to go to her home for a month. I have no opinion to express regarding the case, leaving the facts to speak for themselves.

CASE II.—Mr. B., 58 years of age, presented himself for examination and counsel May 19th last. Family history good; personal history one of steady, difficult work; irregular hours, constant exposures and great mental strain. A steady drinker, but not to drunkenness. Patient stated that he had not been under a physician's care, but had taken different remedies prescribed by that dangerous, though well meaning ignoramus, whose self-confidence is as measureless as his capacity for destruction is boundless, "a friend of mine." No benefit was derived from the remedies sug-

gested so that the patient reported a steady decline in weight and strength for nearly nine months. Associated with this decline there was marked loss of appetite, loss of the sense of taste, and most distressing pain in the hypogastrium. A most aggravating symptom, most persistent in its manifestation was constant spitting. Physical examination disclosed great emaciation, and made known the presence of quite a large mass in the hypogastric region in the abdominal cavity, inclining more to the left side. The growth was about the size of an ordinary fist, and possessed a good deal of mobility. It was found to correspond to the greater curvature of the stomach, the latter having been dragged downward by the weight of the growth. The diagnosis of cancer was made and the x-ray advised as a forlorn hope. A more remarkable response to treatment could scarcely be imagined. The patient was so weak that he had to be carried to the office, and he had already lost over thirty pounds in weight. By the time the third treatment had been given all pain had ceased, the pyrosis had disappeared and the appetite was restored. It seemed impossible to impress the patient with the seriousness of his malady and the necessity of husbanding his strength. Refusing the elevator he would climb four flights of stairs. In less than two weeks, he had twice or three times in one day marched in a street parade. He freely confessed to having eaten forbidden foods and gone to excess in drinking. The inevitable collapse came and the patient died in the latter part of August. I do not believe this patient could have been cured entirely. I do believe that his life might have been prolonged many months in comfort had he known just how to care for himself while battling with his conquering foe.

CASE III.—Mrs. C., age 40; excellent family and personal history. Patient gave history of having been operated upon in February, 1898, for cancer of right breast. A second operation became necessary in just one year from time of first operation. A third operation was performed in October, 1900. At the request of her family physician, Dr. James Hanson, of this city, I removed a recurrent growth in April, 1901. June 9th of the present year the patient came to my office for x-ray treatment. The malady was typical of its kind. There was marked fixation at the shoulder joint, humerus scapula, clavicle and adjacent anatomical structures moved as one piece, while along the line of incision in the axilla several growths the size and shape of a medium-sized strawberry presented. The arm was much swollen, the edematous condition extending to the hand. A foul odor demonstrated the presence of necrotic tissue. Pain had existed for over five months. The patient altogether presented an appearance of unutterable despair, her face marked with lines cut deep by suffering and fear. After the third treatment with the tube set at seven inches the platinum cherry red and the time of exposure being respectively

eleven, ten and five minutes, the patient reported entire cessation of the pain, and in its stead a feeling of well-being so satisfactory that she had been able to sleep a whole night, something she had been unable to do for a long time. Before ten days had elapsed the malignant growths already described, had melted away. With the cessation of pain and a general gain in every way the patient ceased coming for treatment.

CASE IV.—Mr. D., age 82, consulted me less than two months ago for sore on the side of his temple. The history of the trouble was perfect in detail, the patient being a close and careful observer, so that there was no difficulty in making a diagnosis of mild superficial epithelioma. This case differed from any I have met in that only the shortest exposures were permissible. The trouble disappeared as by magic in about three weeks, leaving the temple smooth and natural, save for a slight depression at the site of the disease. Time of exposure less than four minutes, with tube eight inches distant. Treatment was not oftener than alternate days, and sometimes three or four days, as the condition demanded.

Comments. Dr. Bell mentions the divergence of opinions regarding the tube to use, some blaming the low tube for bad effects in treatment, others the high tube. He mentions similar divergence of opinion regarding the merits of the apparatus to energize the tube. He holds that any vacuum tube excited by coil or static machine will be effected under proper conditions. In our opinion we would say that this is the view of the majority of x-ray operators, most of them preferring a low tube for superficial growths. The papers and the discussions in the meeting of the American Röntgen Ray Society will doubtless do much to establish the proper technique, although it is safe to say that no rules will be laid down, only general principles stated.

CORRECTED MAL-UNION IN FRACTURES OF THE RADIUS AND ULNA OF BOTH FOREARMS.

By Carl Beck, M. D., of New York.

Thorough adaptation of the fragments is essential to preserve the functional ability of the bones of the Fracture of either the radius or the ulna alone when perfect coaptation is not secured may prevent supination to such an extent that the unfortunate patient may be prevented from following his occupation. How much more is the functional ability impaired when, after fracture, both bones unite in false positions, with overlapping of the fragments and angular deformity.

To what extent the Röntgen rays enable us to overcome some of the technical difficulties, even in desperate conditions, is illustrated by the following case:

Both forearms of a laborer, aged thirty-four years,

*Case presented to the Surgical Section of the New York Academy of Medicine, October 14, 1902.

were caught in the wheel-strap of a powerful machine and broken. The patient was brought to the hospital, where proper efforts were made to reduce the displaced and partially splintered fragments.

At first reposition seemed to have been successful, and the swelling disappeared, but both hands remained stiff and paralyzed, and, excepting the thumbs, were without sensation.

Extensive oedema having repeatedly been present, the disturbance in motion as well as in sensibility seemed to me to be of an ischaemic nature rather than caused by a direct trauma to the nerves. The muscular atrophy, which is still present, also points to a breaking down of contractile muscular elements. By the courtesy of Dr. Norris, of Passaic, I had an opportunity to see the patient, for the first time on July 24th, three months after the injury. I then found angular deformity, abnormal mobility, and the functional disturbances described above on both sides.

The skiagraphs of both forearms showed considerable overlapping. In the right forearm overlapping of the radial fragments existed in the middle, and lateral deviation of the ulnar fragments an inch below. The skiagraph of the left side shows the overlapping of both sides, and also the formation of a bone bridge between the lower fragment of the ulna and the upper fragment of the radius, which alone would exclude any possibility of rotation.

On August 3, I concluded to correct the position of the fragments of the right forearm by exposing and freeing them. Under the guidance of the skiagraph I made a semilunar incision in an oblique direction, and overcame the shortening by resorting to forcible extension. The fragments were then united by silver-wire sutures. The *modus operandi* consisted in freeing the old adhesions thoroughly with knife and chisel and folding the arm, so to say, completely. By encircling the two antibrachial fragments with a strong bandage the folded mass could be steadied by an assistant, so that the necessary holes could be bored in both fragments of ulna and radius respectively. As shown by the skiagraph, taken six weeks after this operation, the radial fragments are in ideal apposition. The ulnar fragments show light lateral displacement, while the callus formation has assumed so fortunate a character that no other depression or protrusion remains.

Five days after the first operation the left side fracture was exposed in the same way. In spite of extensive exposure of the fractured area the fragments could not be forced into apposition except by shortening them. So I made a virtue of necessity by giving the ends of the fragments a triangular shape, which enabled me to indent them into each other. As the skiagraph shows, taken four weeks after this operation, the apposition of the radial fragments is perfect. The ulna does not show lateral deviation, none

of the medullary lines presenting any axial divergence. The skiagraph showed, however, that there was a slight angle, which could be corrected in time by simple pressure.

Union took place by first intention without any reaction. The healing process was quicker on the left side, which is explained by the absence of wire-suturing. To be sure that consolidation was perfect, I immobilized the arm until the present time, leaving off the plaster-of-Paris splint temporarily for the employment of massage. The final result will, no doubt, be perfectly satisfactory.

Thus we see how the happy era of combined asepsis and skiography permits of the correction of even the most extensive deformities in a simple and safe manner.

From a theoretical point of view it should be expected that on account of the more abundant callus-proliferation, induced by the irritation of the wire sutures, consolidation would be quicker and more thorough. But practice proved the contrary in this instance, and it seems to be that indentation permits of more accurate adaptation and immobilization. At the same time larger surfaces for agglutination are obtained and the soft tissues are less liable to be disturbed. The triangular indentation of the fragments should therefore be preferred, whenever possible.

The modus operandi for indentation is practically the same in the other case.

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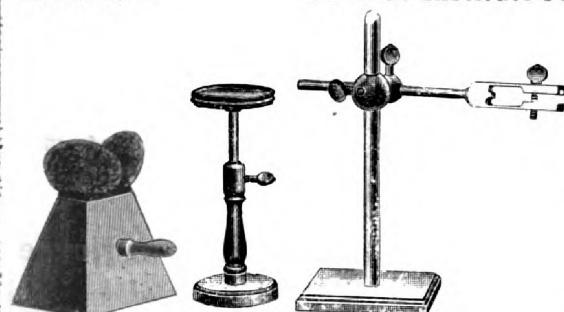
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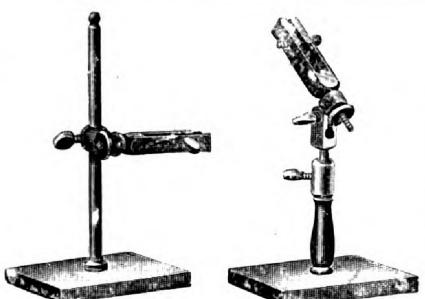
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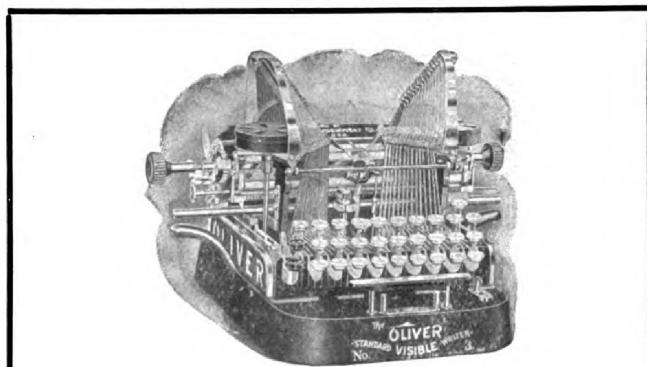
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a difference of opinion between experts may happen in court, and the patient may become the victim of an imperfect technic.

"A counterpart to this case is the one of a boy who was under my treatment after extirpation of his cervical glands, and who sustained a contusion of the forearm, while I happened to be absent from the city. So he was referred to a brother physician, who was supposed to be an expert in Röntgen science. Relying entirely upon the fluoroscopic screen, he claimed to have seen the fracture line and declared a photograph to be unnecessary. A plaster-of-paris dressing extending over wrist and elbow, was applied in consequence. A few days later, when the patient was referred back to me, I made a fluoroscopic examination of the arm, and as I could see no fracture line, I took a skiagraph through the plaster-of-paris dressing. No evidence of fracture being found, I removed the plaster-of-paris dressing, although the bones presented themselves very distinctly. This third skiagraph proved that there was absolutely no fracture, a fact which was corroborated by the perfect function of the arm.

"These two cases afford further support for the demand that only blameless skiagraphs should be admitted as evidence in court."

Another question is liability for damages in cases of obscure diagnosis:

"A girl of twenty-three years fell downstairs on March 5, 1902. The family physician found considerable deformity, which he corrected to a great extent. When the swelling surrounding the whole elbow did not subside after a week, he referred the patient to me. Before I made a Röntgen examination I had the impression that there was a fracture of the external condyle. But the skiagraph revealed the presence of a fracture of the head of the radius, associated with considerable displacement, infraction of the external and fracture of the internal epicondyle, the latter injuries without displacement. Since I could locate the displaced radial fragment so well by the rays, I assumed that I could now also succeed in reducing it. But I was not able to palpate it. A fairly large number of physicians tried the same, but, with the exception of

a young practitioner, none could feel it. So I marked the position of the fragment as my anatomical knowledge indicated it and pressed inwardly. Now I applied a fenestrated plaster-of-paris dressing, through which I took the skiagraph. This showed most impolitely that I had not only failed in my efforts of reposition, but had even made it worse. Now I tried to reduce it in the extended position, as it is indicated in the third skiagraph, and there I could press the fragment nearer to its normal position. This encouraged me to make a fourth attempt in the same position of the arm, and this time I succeeded fully, as the skiagraph shows. As you see the result is a good one.

"In this case a diagnosis without the Röntgen rays was simply impossible, and without the diagnosis the patient would surely be crippled. It was not until weeks had passed and the swelling had subsided that I was able to grasp the radial fragment, which is of such great importance in view of its joint surface. Would the court have the right to censure the physician if he had not advised skiagraphy? Could he be accused of professional negligence? If litigation ensued, would the other party have had the right from the beginning to insist that a skiagraph be taken? And if I had not succeeded in reducing the fragment, would I have been criticized? I leave these questions to our learned lawyer friends. What, I may ask further, does secure the identity of the patient who is skiagraphed? Is it sufficient that he signs his name on the envelope of the plate, with a pencil containing impermeable substances, so that his signature is photographed together with the limb, or is it necessary to have a witness present, or both?"

Comment: Cases like those above mentioned are not infrequent and yet are rather the exceptions. There is now the danger that x-ray enthusiasts go to the extreme of demanding the use of the x-ray in every case. Now while this should be done wherever convenient and above all wherever the diagnosis is obscure it must nevertheless be admitted that surgery has been successful in the vast majority of fractures without the aid of the x-ray. Dr. Beck does well to state that a faint picture is of no value whatever.

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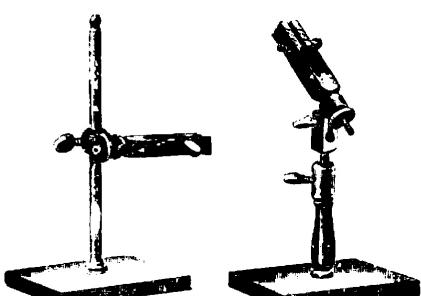
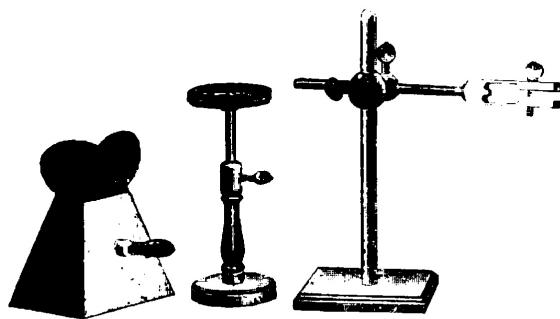
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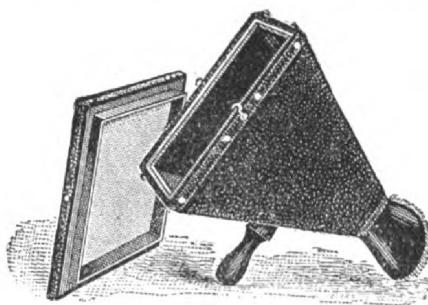
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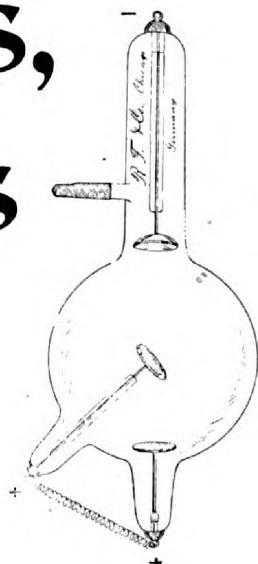
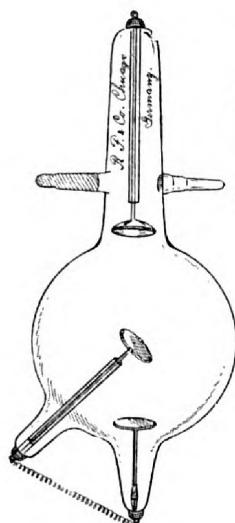
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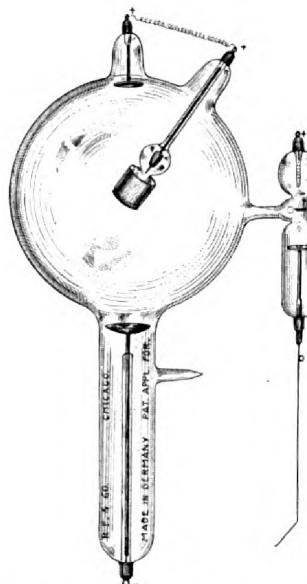
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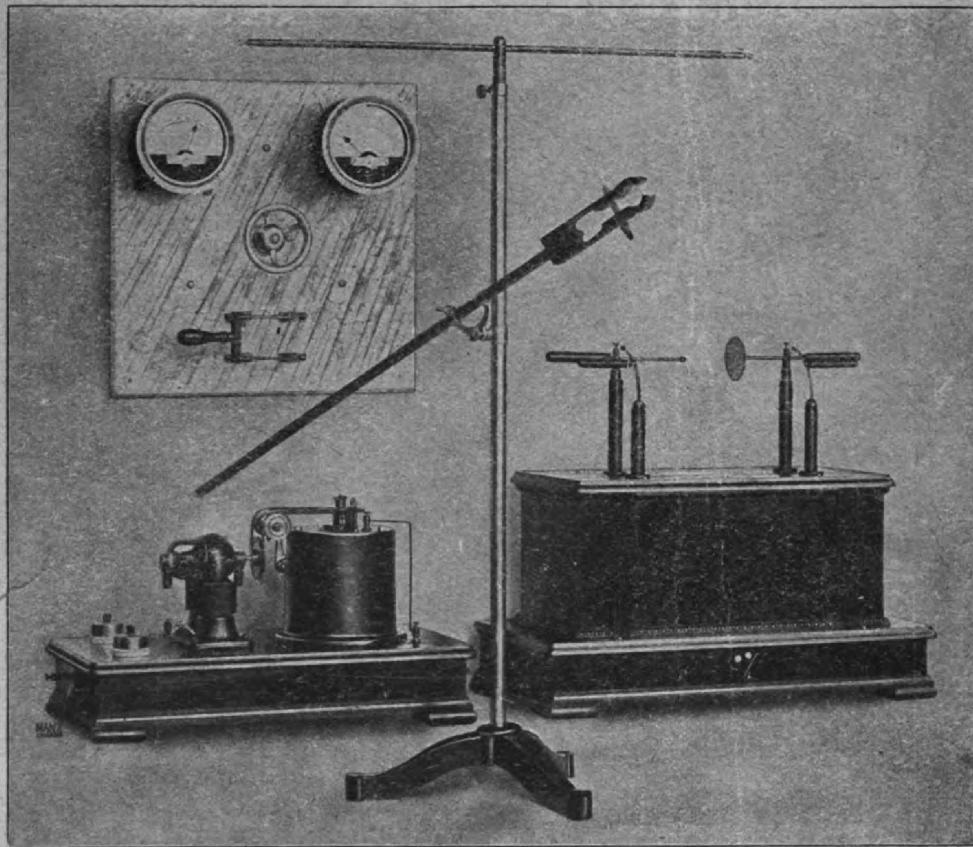
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